RUBBER and PLASTICS WEEKLY

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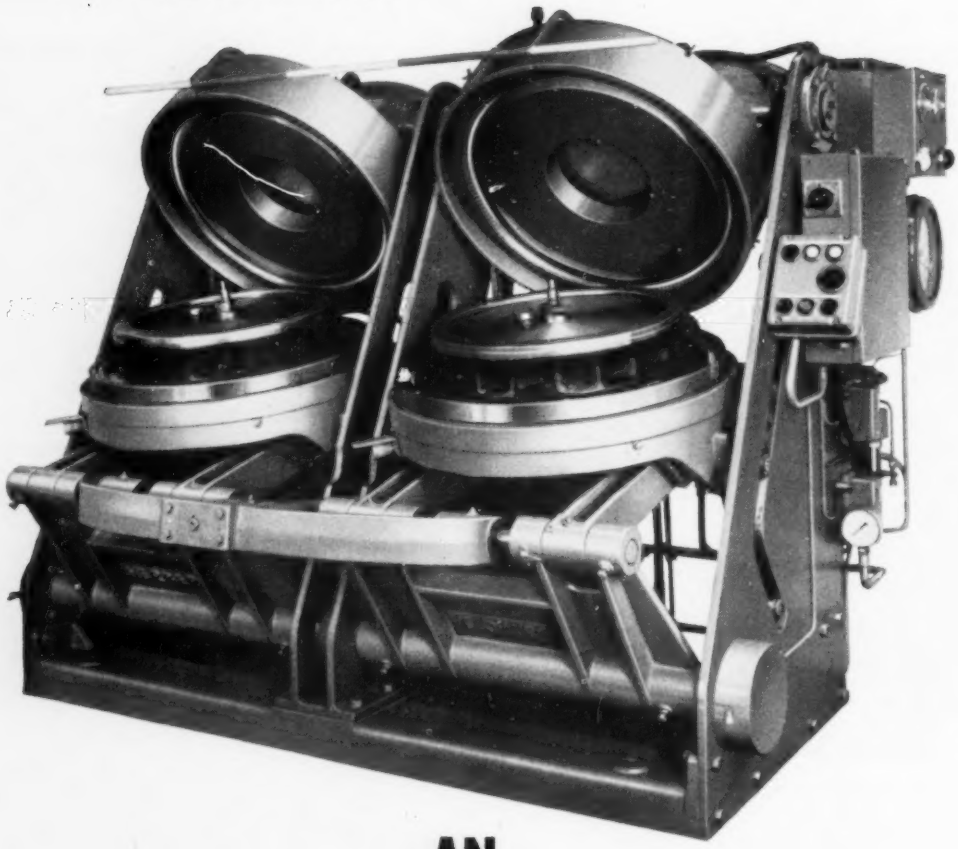

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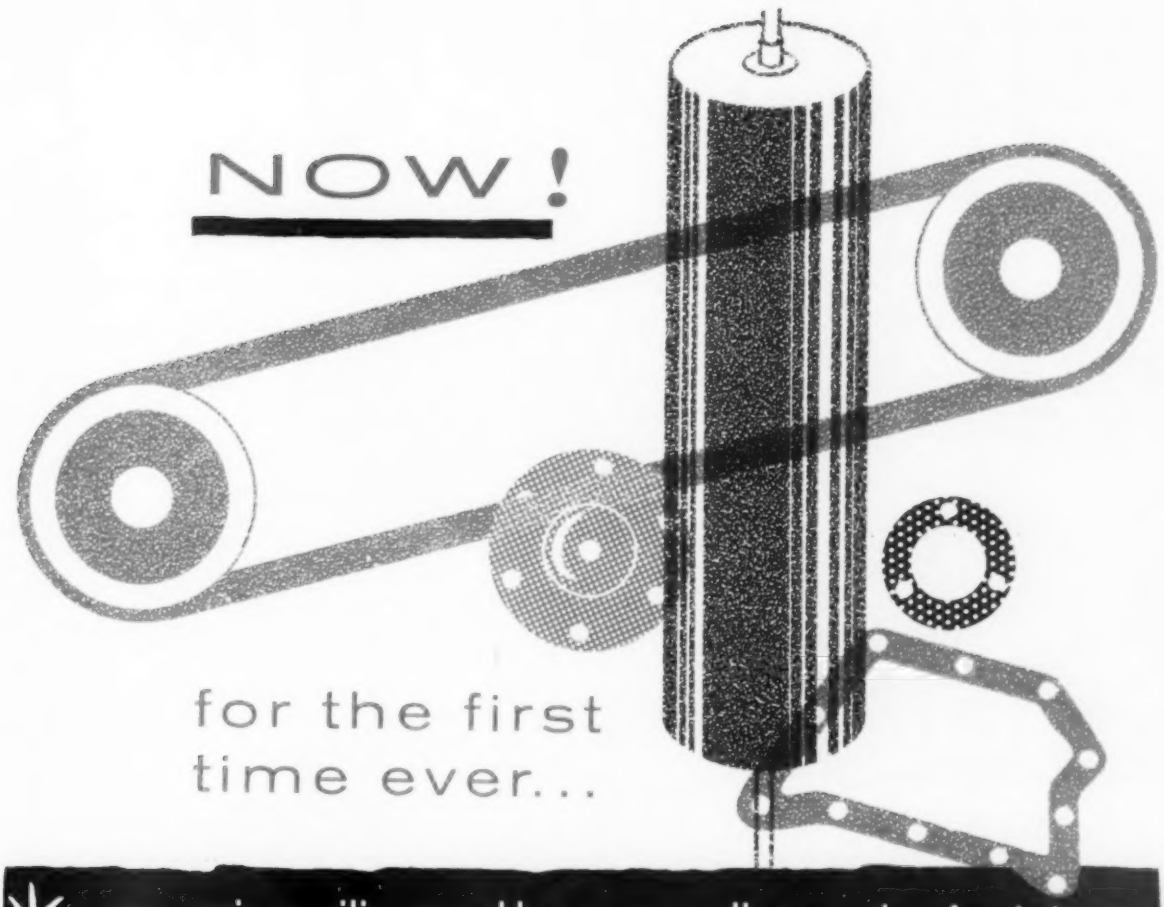

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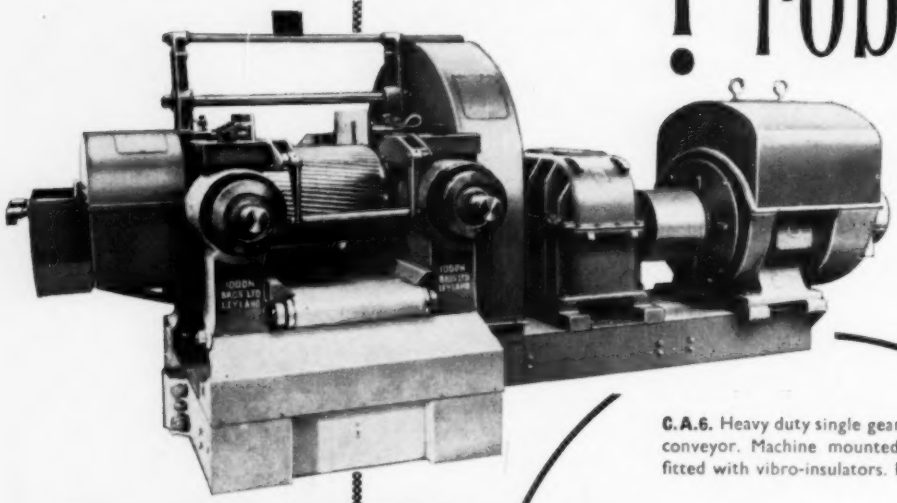

C.A.6. Heavy duty single geared Cracker with take-off conveyor. Machine mounted on fabricated subframe fitted with vibro-insulators. Rolls 20" diameter.

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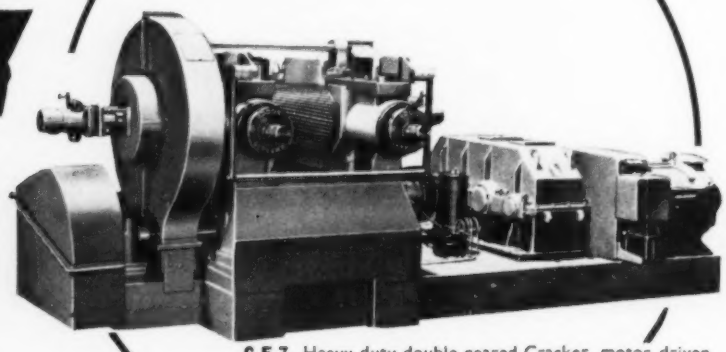

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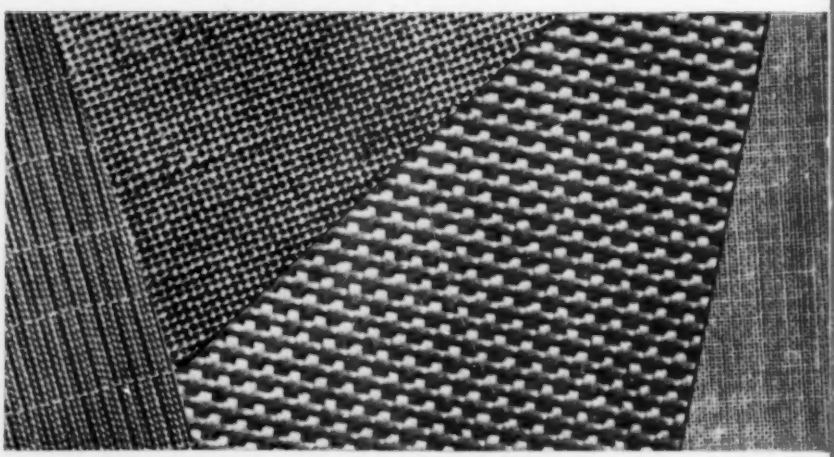

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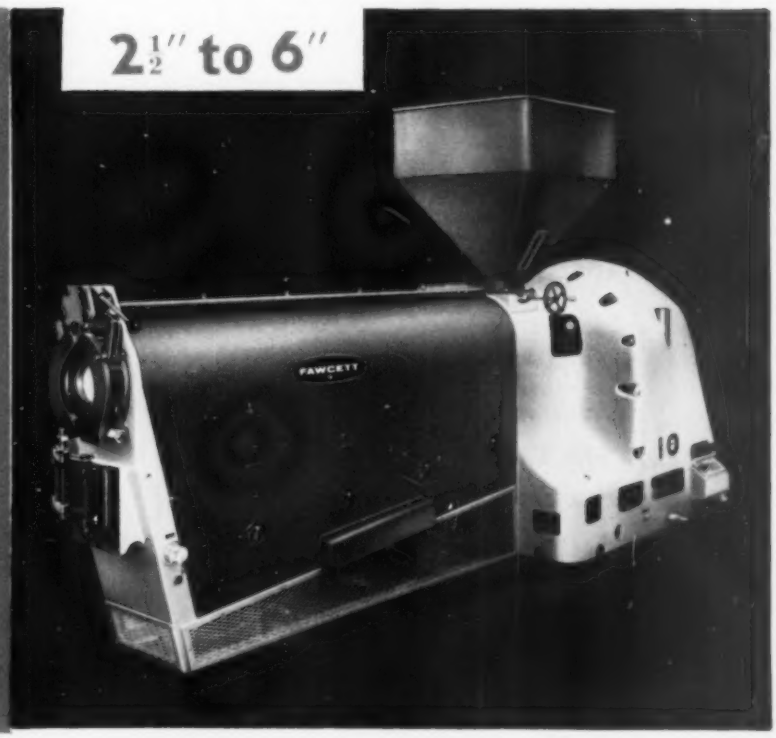

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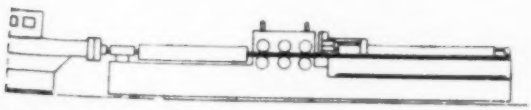
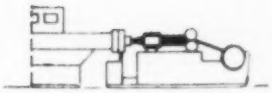


Rigid tubes and profiles (polystyrene, rigid PVC, etc.)



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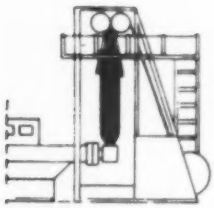
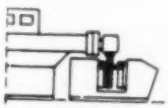
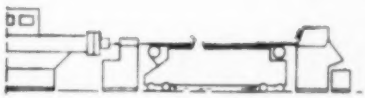


Lay flat tubes in polythene



Blow moulder



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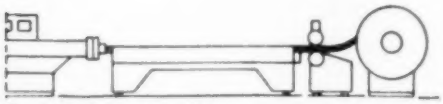

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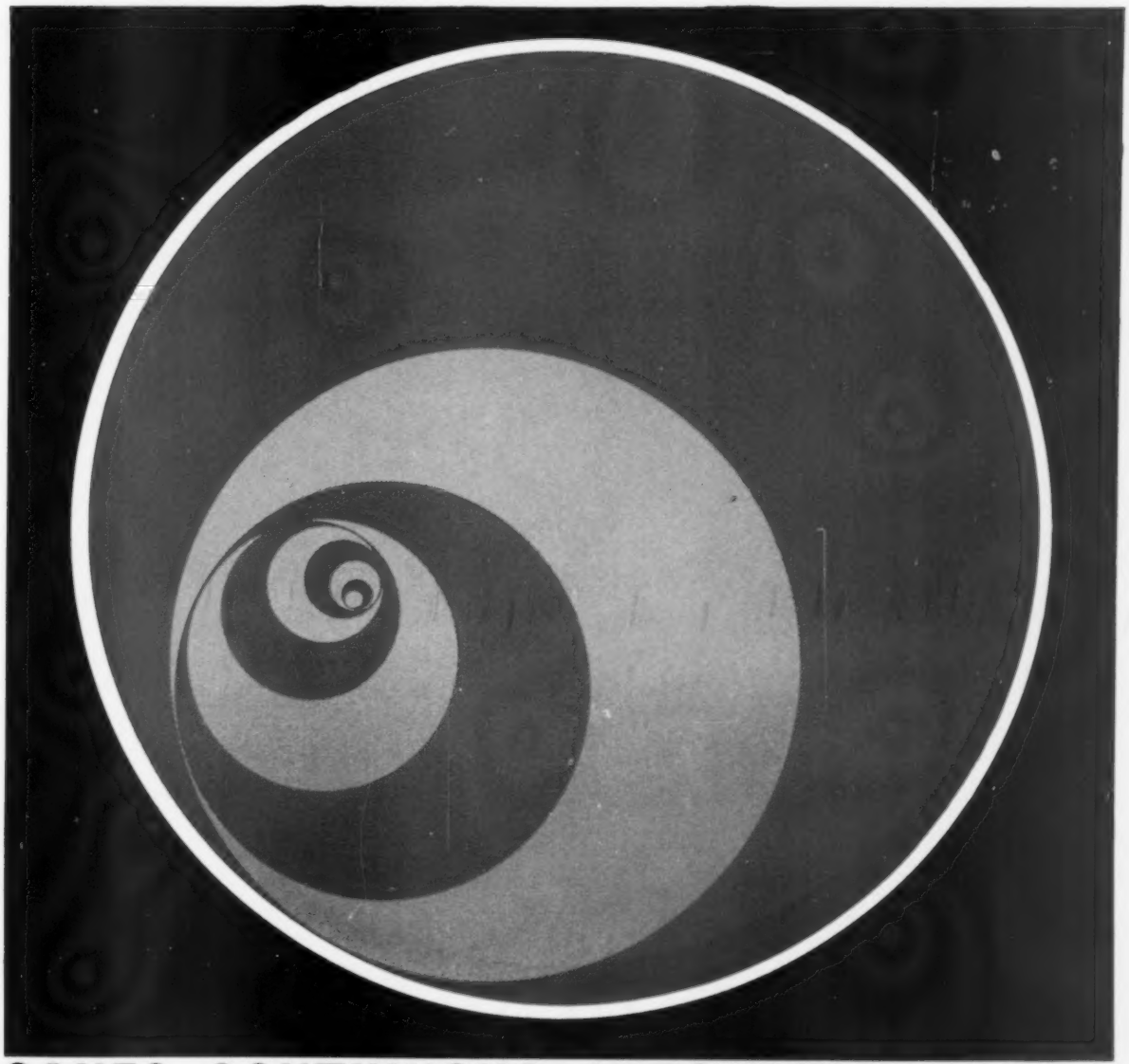

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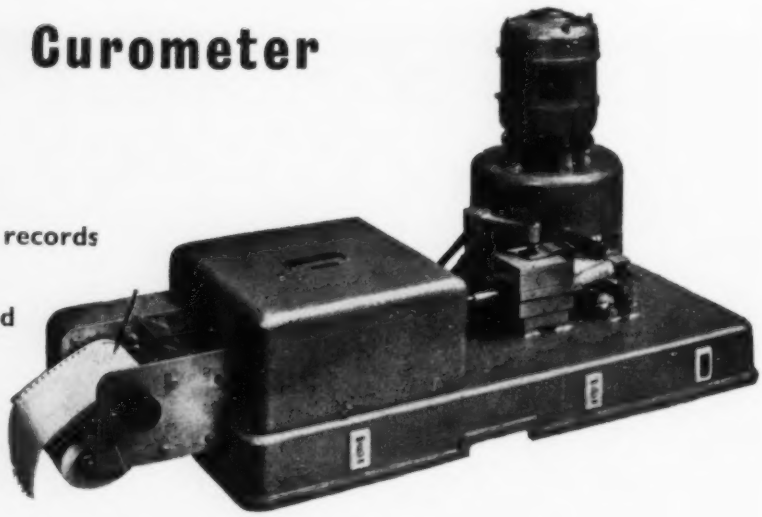

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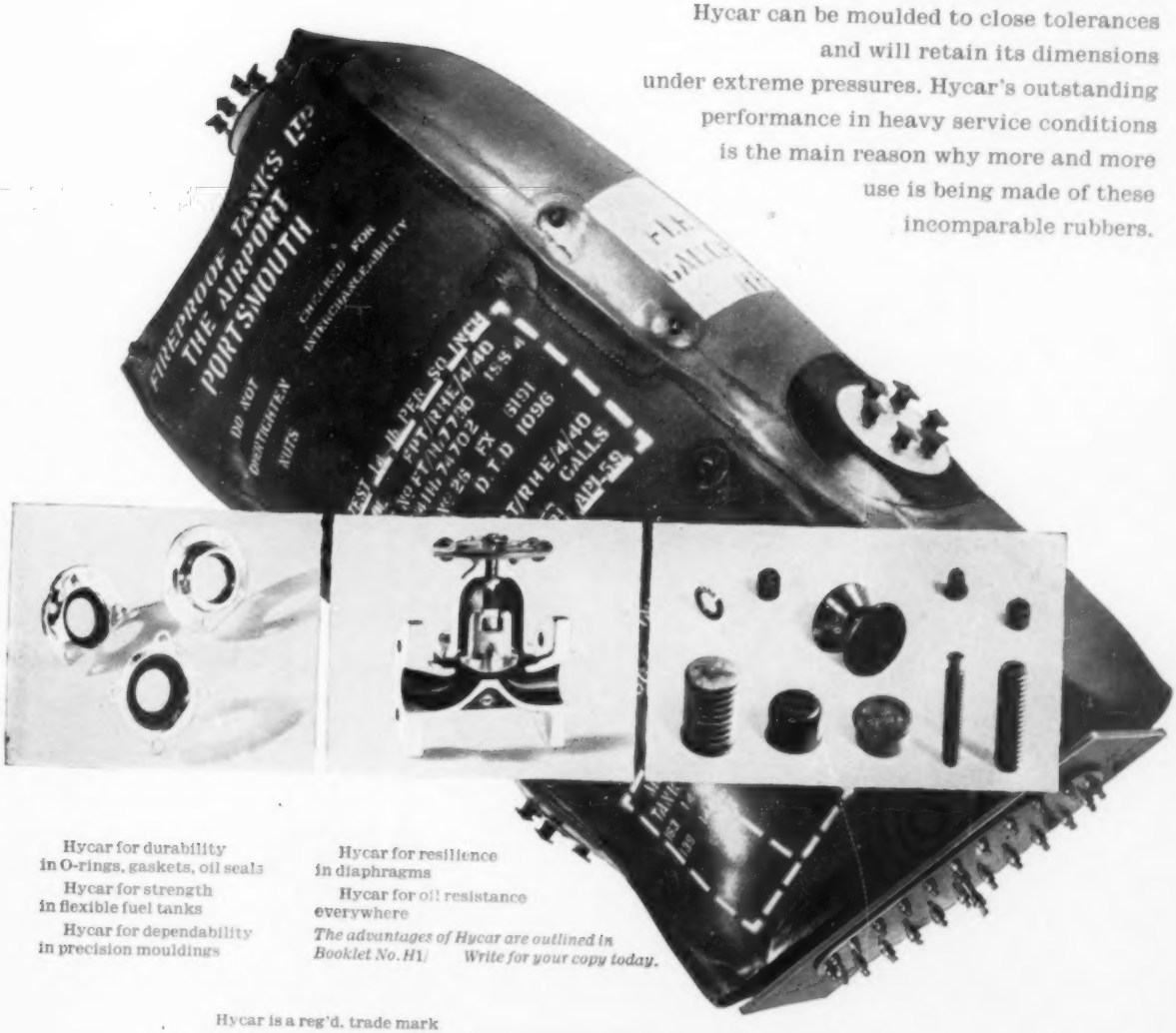

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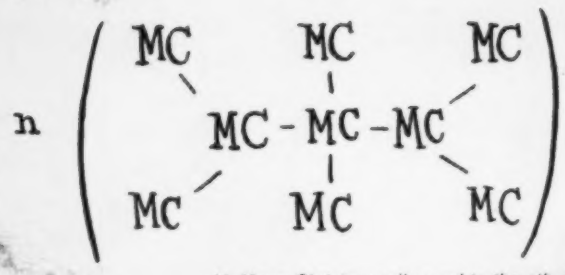

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 141 IN ITS 78th YEAR No. 25

December 16 1961

Editorial

NOTES OF THE WEEK 969

Articles and News

NEWS BRIEFS 970
FENNER GROUP RESEARCH CENTRE 972
POLYTHENE ANTI-DUMPING 974
PHYSICAL TESTING OF FOAMS—1 976
RMEA SAFETY STUDY CONFERENCE 980
BOAT IN A PARCEL 982
PLASTICS MACHINERY DEVELOPMENTS 990
IRI GOLF: LONDON SECTION DINNER 992
RAPRA IN THE REGIONS 995

Features

VIEWS AND REVIEWS 984
MEN AND MATTERS 986
THE LEGAL ANGLE 988
PLASTICS STATISTICS 993
PLANTATION NEWSLETTER 996
RUBBER STATISTICS 996
BOOK REVIEW 997
RUBBER MARKETS 998
INDUSTRY INTELLIGENCE 999
MATERIAL PRICES 1000

Classified Advertisements . . . 1003 Advertisers Index . . . 1006

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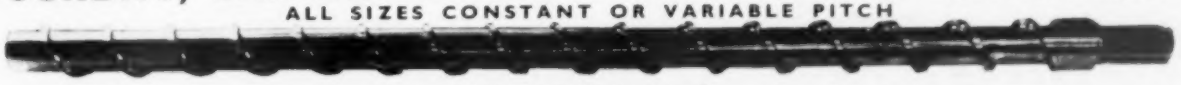

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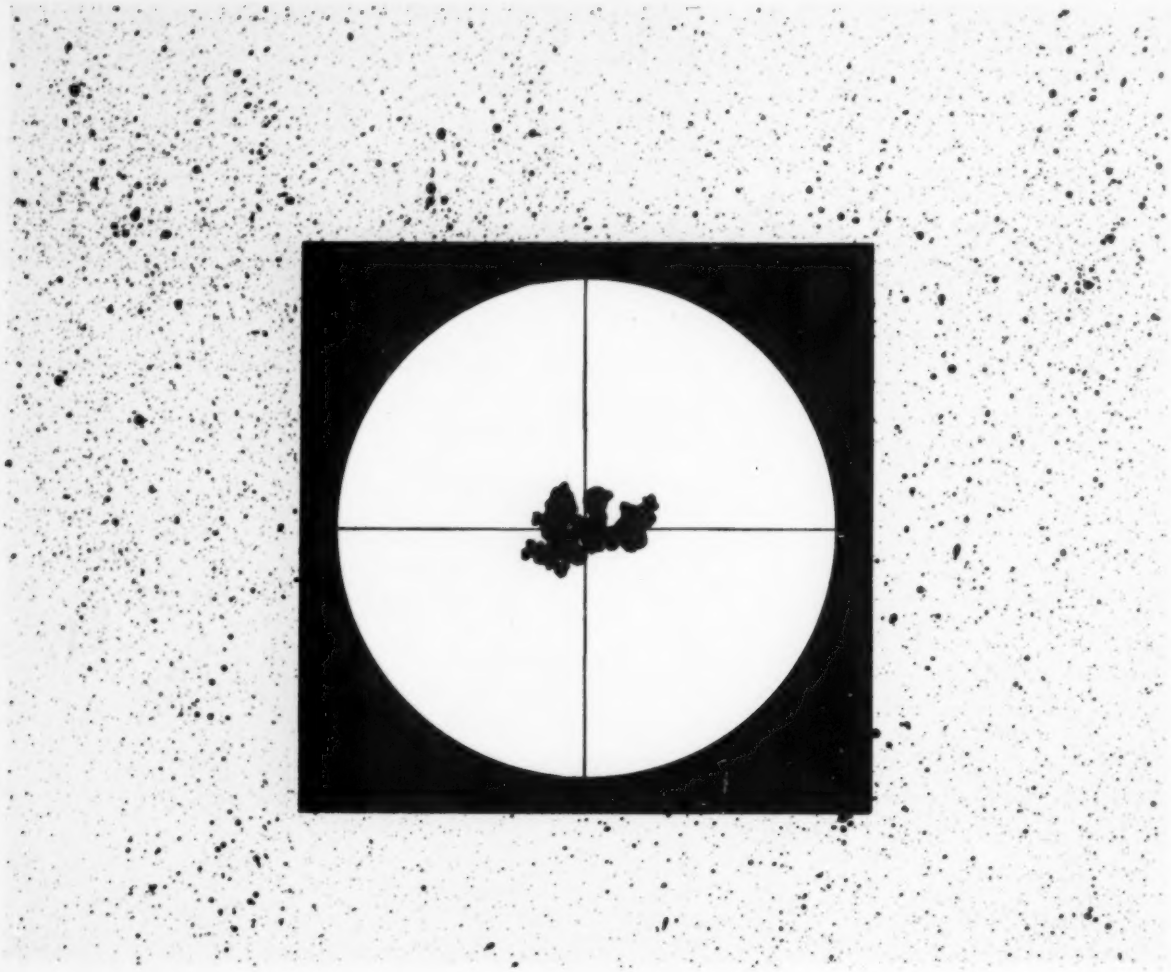

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NOTES of the WEEK

Opening the Valve

ANOTHER chapter in the UK movement for a polythene anti-dumping duty was written last week. When the Board of Trade announced that it was considering an application for anti-dumping legislation against bulk polythene imports from USA, it said that the application 'may be extended to include other countries' (*RPW*, December 2, 895). Now one country has been named — Italy. Representations on this can be made up to December 22.

The UK action (complaints to the Board of Trade about alleged dumping were made by I.C.I., Monsanto and Union Carbide) is part of a general European movement. France has already instituted a duty against a particular source of polythene, while West German firms have approached the Ministry of Economic Affairs in Bonn. The Netherlands, also, may be planning to impose a duty. This form of action is also being contemplated for other chemicals; the economic consequences of the almost fatal ease with which the production of many materials can be increased — by simply opening the valve a little wider. (The full text of the Board of Trade's anti-dumping application extension to Italy appears on page 974.)

Chemical Engineering Congress

THE design of a plant for the processing of fluids may be based on well-understood theoretical treatments, requiring a knowledge of physical constants which can be measured without great difficulty. But solids are a different matter — as any chemical engineer frequently finds to his cost. They have to be dealt with much more empirically, and scaling-up problems in particular may be formidable.

So far design has been based largely on experience or 'rule of thumb' because of the lack of sound theory applicable to bulk solids systems. Chemical engineers will be able to come to grips with these problems at the European Chemical Engineering Congress, to be held in Britain next year.

'Handling of Solids' will be the subject of one of four symposia at the Congress, and the papers will deal with the study of the controlled flow of bulk solids, the cohesion of solid particles to one another in the form of agglomerates, continuous weighing, and problems arising in handling solids.

Information released by the Department of Scientific and Industrial Research this week shows that the Congress (to be held at Olympia from June 20-29 1962) will be one of the most important events in the industrial calendar. Although it is a general chemical congress, the DSIR information indicates that it will be of particular value to a number of industries, including the rubber, plastics and synthetic fibre industries. Besides the handling of solids, the other three symposia are likely to be valuable to our industries. They will deal with the interaction between fluids and particles, process optimization — automation under optimum conditions — and the physics and chemistry of high pressures.

Chemicals Behind Plastics

THE rise of plastics has lifted a number of chemicals that are their raw materials out of commercial obscurity. One such chemical that is on its way up is phosgene. It was discovered by Davy nearly 150 years ago, but up to a few years ago all that an industrial chemist might have been able to say about it was that it was manufactured from carbon monoxide and chlorine and that, in the words of the school textbooks, it has 'an odour of new-mown hay'. Others might remember, more bitterly, that it was used as a war gas by the Germans in 1915 (it is about ten times as toxic as chlorine and non-persistent) and was responsible for about 80% of the gas casualties in the first World War.

Now more welcome outlets in the production of plastics and other materials are making it into an important chemical. The principal outlet is in the manufacture of isocyanates for urethane foams, but polycarbonates are also taking an increasing quantity. In the UK I.C.I. has just completed a 10,000-ton phosgene plant at Fleetwood to feed its toluene di-isocyanate plant, which is being extended. Du Pont is planning a multi-million-pound phosgene and TDI plant at its Maydown, Northern Ireland, site. In America so little phosgene was produced that the US Tariff Commission did not issue any figures until 1957, when it estimated output at only 5m. lb. American production is now put at sixteen times this figure and by next year is expected to reach 110m. lb.

One American producer, PPG Chemical — which has been carrying out a great deal of work on the preparation of hundreds of phosgene derivatives — thinks that production is going to leap up at an even greater rate in the next few years. A study of the pattern of end uses (which considers that urethanes could show a two- to three-fold increase in the next three years) indicates that the US figure alone will reach 240m. lb. And this could prove conservative if the polycarbonates become more firmly established.

NEWS *Briefs*

SNPD TO ENTER PLASTICS—DOW UP AND DOWN
SPANISH PVC PROJECT—45m. lb. VINYL ACETATE
PLANT—CANADA POLYTHENE FILM PRODUCTION

●**France** — Société Nationale des Petroles D'Aquitaine has decided to enter the plastics production field, according to a company announcement in Paris. Present plans envisage an annual output of 25,000 tons of styrene — which may be increased later — and 10,000 tons of polystyrene. Raw materials will be provided by the company's natural gas deposit and chemical plant at Lacq in south-west France. A company spokesman said the new products should find a ready market because domestic styrene consumption was expected to rise under the Fourth French Development Plan. Any surplus would be exported.

●**United States** — Monsanto Chemical Co.'s hydrocarbons division is to construct a multi-million dollar plant in Texas City for production of vinyl acetate monomer. The plant, which will be completed by the end of 1962, will have a capacity of 45m. lb. annually. The output will be used by other Monsanto plants in making vinyl plastics and emulsions.

●**Ceylon** — The Ceylon Government has started talks with US officials in Colombo on the release of rubber from the American stockpile which, it is claimed, has tended to depress the rubber market. Officials of the Ministry of Commerce said the talks were exploratory and would be followed by a similar approach to British authorities. Trade circles have pointed out that Britain and USA acted contrary to previous understanding in releasing further rubber from the stockpiles.

●**India** — The Lummus Co. on behalf of Synthetics and Chemicals, Bareilly, India, has awarded a contract for two large synthetic rubber dryers to L. A. Mitchell, industrial drying engineers, Manchester.

●**Canada** — First of the additional units for the manufacture of heavy-guage polythene industrial shipping bags has been completed by the Mastex Films unit of Canadian Industries Ltd., at Brampton, Ontario. R. B. Wotherspoon, plant manager, said that further facilities will be in production this month. This expansion in the company's bag manufacturing operations, said Mr Wotherspoon, was necessary to meet a growing demand for weatherproof and chemical resistant bags for packaging such items as fertilizers, rock salt and chemicals and plastics in granular or powder form. Canadian manufacturers shipped 20m. lb. of polythene film, sheet, etc., the Dominion Bureau of Statistics reports in 1960 — an increase of more than 23% over the preceding year's 16.95m. lb. The 1960 value was $10.7m. as compared with $9.3m. a year earlier.

●**Israel** — The Monsanto Chemical Corp. of St. Louis is reported to have signed an agreement with an Israeli company, according to Barclays Bank DCO. Under this it will supervise the erection of a dichloroethane plant near Acre and supply the know-how for the production of this raw material for the manufacture of vinyl polymers.

●**Spain** — A new section for the production of 21,000 tons of vinyl chloride and 10,000 tons of pvc a year is to be added to Monsanto Ibérica's factory at Monzón, Province of Huesca, Spain, under the firm's request for permission to expand. The factory manufactures calcium carbide, acetic acid and synthetic fibres.

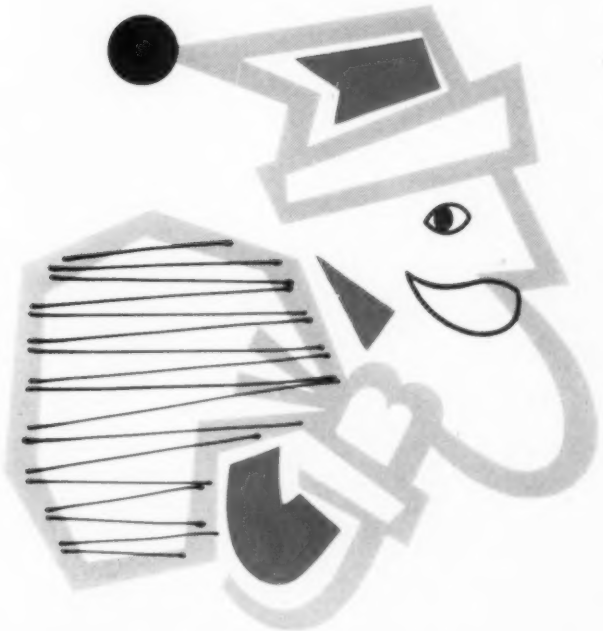
●**Thailand** — The terms of a proposed trade agreement between Thailand and the Soviet Union are being drafted by officials of the Thai Foreign Affairs and Economic Ministries, Banjerd Cholavicharn, chairman of the Board of Trade, has announced. Mr Banjerd said the main Thai export items to the Soviet Union might be rice, rubber and tin, but he added that Thailand still considered the United States its chief export market for rubber.

●**United States** — Dow Chemical Co. has cut the price of polystyrene plastics by one cent a lb. less than three months after raising it by the same amount. The new price for polystyrene in bags is 18 cents a lb., the prevailing list price among most of Dow's competitors. This is the second time within a year that Dow has raised the price of polystyrene and then reduced it when competitors continued to charge lower prices.

●**India** — The complete shoemaking machinery equipment for a rubber shoe factory in the Province of Andhra, India, with a capacity of 40,000 pairs a day, will be supplied by AB Svenska Skolastfabriken, Jarrestad. The order, worth 13m. Swedish crowns, includes all types of machines, from big rubber-mixing plants to small industrial sewing machines.

'I'm arranging for you and every member of your staff to have an immediate saliva test!' — 567

Seasonal



Greetings

From Anchor Chemicals

Fenner Group Research Centre

OPENED BY LORD ROBENS AT HULL

J. H. FENNER AND CO. LTD. opened a new research centre — called the Hainsworth Research Centre — at Hull on Friday (December 15). The centre, on a site facing Fenner's Hull factory and headquarters, was formally opened by Lord Robens, chairman of the National Coal Board.

An artist's impression of Fenner's Hainsworth Research Centre

It provides full research facilities for all the companies in the Fenner group, including subsidiaries manufacturing oilseals and mining equipment. Products developed and tested include synthetic rubber seals for use in machinery, aircraft and motor vehicles, in addition to flameproof colliery conveyor belting, hydraulic roof supports, idler rollers and conveyor belt jointing equipment for the National Coal Board. At the centre research will continue into Fenner mechanical power transmission products.

'L'-shaped Lab.

The building employs a novel form of pre-cast concrete construction and has a frontage of 160ft. and a depth of 200ft. It comprises a two-storey 'L'-shaped laboratory and office block screening a single-storey engineering and development area. The total floor area is 38,000 sq. ft. Other accommodation includes executive offices, library, chemistry and physics laboratories, physical properties laboratory, and quality control and prototype laboratories.

A feature of the building is the absence of internal columns, which gives complete flexibility to the glass partitions dividing the various offices and laboratories.

S. B. Hainsworth, chairman and managing director of the Fenner group, after whom the centre has been named, joined the company as manager of the weaving department in 1921. When he became the managing director in 1945, the company had been built up to a capital of £250,000 and the previous year's profit was £91,000. Today the capital and reserves have increased to over £2m. and the profit for 1960 was £909,000.

Fenner research and development dates from 1921 when Mr Hainsworth began his research on rubber latex impregnation while developing textile structures best suited to belting in service. These woven beltings found ready sales but the short-centre V-Belt drive was already at hand. By 1937 Mr Hainsworth produced the first Fenner V-Belt.

Closed Cell PVC

A 'REVOLUTIONARY' method of constructing refrigerated and insulated vehicles, eliminating the need for a basic timber body framework, has been made possible by the use of Plasticell, the closed cell expanded pvc manufactured by Microcell Ltd., a subsidiary of BTR Industries Ltd.

In conventional methods of construction metal or timber vehicle bodies are made up of rings and connected by means of longitudinal members. A standard insulating material is then used for filling the framework cavities.

Mann Egerton Co. Ltd. of Norwich, has developed a sandwich panel using Plasticell as a core. For this application the pvc has been skinned with 20g. aluminium, bonded with a bitumastic resin adhesive, the joints in the insulating material being joined to form a complete body section.

The high strength and low weight of this material — it acts as a structural core as well as an insulating medium — has been used to achieve panels of extreme rigidity and lightness. The D.40 grade of Plasticell has a compression strength of 40psi, a density of 2.5lb. per cu. ft., and a 'K' value of approximately 0.2BTU/in./sq.ft./°F. Also vapour permeability is as low as 0.0026 grains/sq. ft./1in. thickness/millibar — equivalent to some vapour seals.

Masters Tournament

The 1962 Dunlop Masters Tournament will take place on June 29 and 30 at Wentworth.

Sheffield Rubber for Indian Trains

TEMPERED Rubber Components Ltd., of Sheffield, has recently completed the manufacture and shipments of a consignment of rubber-to-metal bonded fittings for rail coaches being built in India.

The order comprised 1,200 rubber-to-metal bonded buffers, 2,400 rubber-to-metal bonded stops and 9,600 rubber-to-metal bonded axle-holding arm rubbers.

These parts, destined for bogies of integral rail coaches being constructed in India to the specifications and design contracted between the India Government and the MAN Co. of West Germany, had to conform to British Standards, British Railway Standards and further standards specified by the MAN Co. Stringent dynamic compression and shear tests equivalent to many years' service life were undertaken throughout the production of the parts to check their overall quality and the rubbers were specially compounded for use in tropical climates.

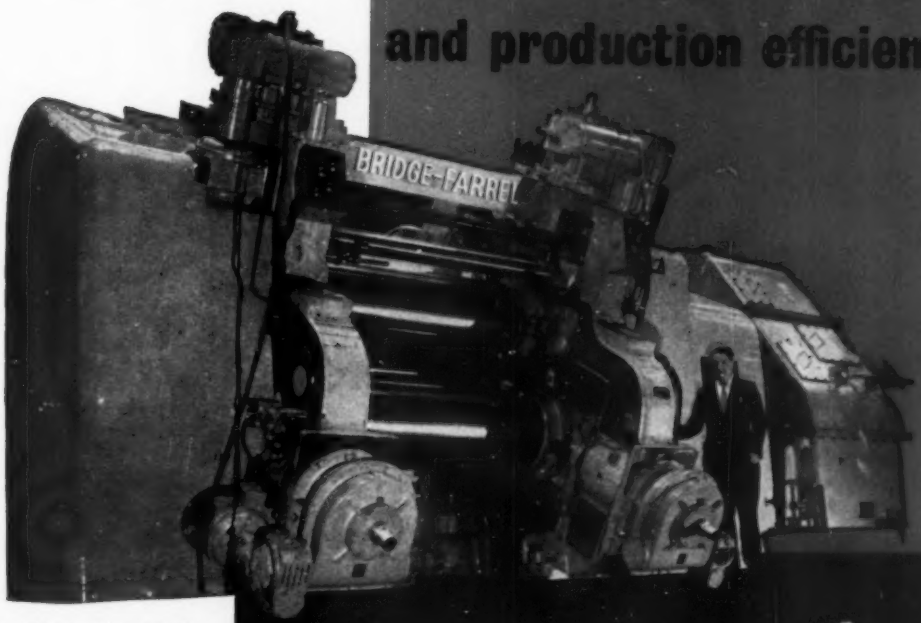
Tempered Rubber Components Ltd., a member of the Tempered Group of companies, obtained this contract from the India Store Department against stiff competition. Company officials state that they believe this was partly due to the fact that it was the only one of the companies asked to tender which had full production and technical facilities for both rubber and metal parts.

Bee Chemical Co. in UK

Bee Chemical Co., Lansing, Illinois, has opened a European Division at Fraser Road, Erith, Kent. The company specializes in the formulation of coatings for plastics decorating and vacuum metallizing.

BRIDGE FARREL equipment

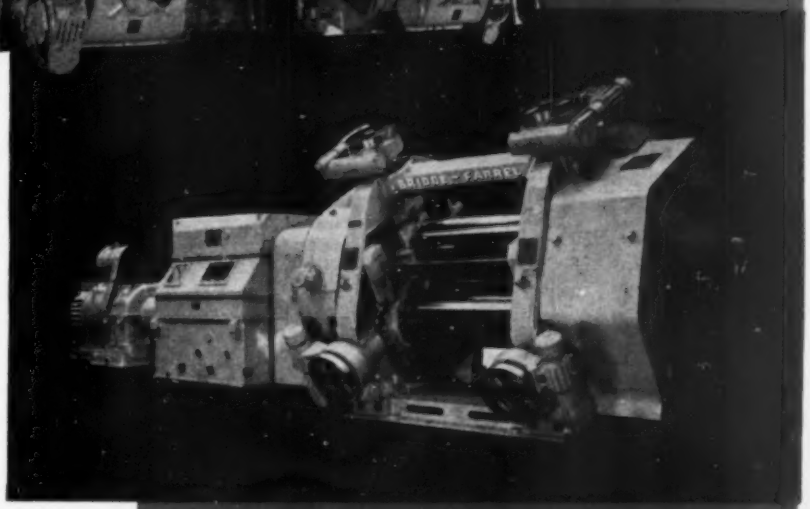
. . . acclaimed as the ultimate in design and production efficiency



28" x 74" Inclined 'Z' Plastics Calender.

Advanced engineering features include patent hydraulic loading on the final nip and all the finest features of Plastic Calender Design.

BRIDGE-FARREL calenders give tolerances of ±.0001" on thin calendered plastic film at speeds up to 320ft. per minute.



Bridge-Farrel 24" x 66" 3-Roll Triangular Calender. The illustration shows one of several recently built and in operation, and considered to be the fastest precision Rubber Calenders in the world.

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Polythene Anti-dumping

APPLICATION NOW COVERS ITALY

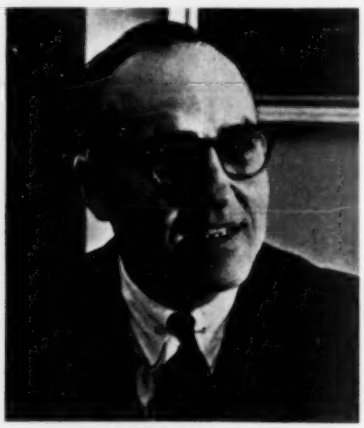
THE Board of Trade has extended an application for an anti-dumping duty to be placed on imports of US polythene to cover shipments from Italy. The full text of a BoT press announcement is:

'The Board of Trade announced on November 24 1961 that they were considering an application for the imposition under the Customs Duties (Dumping and Subsidies) Act, 1957, of an anti-dumping duty on polyethylene (polythene) in blocks, lumps, powders (including moulding powders), granules, flakes and similar bulk forms imported from the USA. The Board of Trade now announce that the application has now been extended to cover imports from Italy.

'Any representations which interested parties may wish to make in connexion with this application should be submitted in writing not later than December 22 1961. A statement of the applicants case will be made available to all interested parties who wish to make representations in the matter if they are prepared to give an undertaking to treat the information contained therein as strictly confidential and to allow their comments to be passed to the applicants for reply. Requests for a statement of the case together with an undertaking in the terms set out above, should be addressed in writing to the Board of Trade, Tariff and Import Policy Division, Room 3139, Horse Guards Avenue, London, S.W.1'.

Vila to be North British Chairman

H. E. Humphreys, Jun., chairman of the board of United States Rubber Co., has resigned as chairman of the North British Rubber Co. Ltd., his resignation becoming effective on December 31.



GEORGE R. VILA

He is succeeded as chairman by George R. Vila, who is president of United States Rubber Co., to which the Scottish firm is affiliated.

Sale of Rubber Land

Anglo-Asian Rubber Plantations Ltd. announced recently that it has agreed to sell 900 acres of old rubber land at a price of about £45,000 to Kulim Rubber Plantations Ltd., Malaya, and has granted Kulim an option to purchase a further 2,350 acres. The purchase price for any land taken up under the option may be satisfied either in cash and/or shares in Kulim.

Kulim is to use the land for developing oil palms plantations.

More Plant for Phoenix Rubber

PRODUCTION of prime grade pvc compounds at the Slough, Bucks, factory of the Phoenix Rubber Co. Ltd. almost doubled last month after the new machinery which the firm has installed became fully operative. Because almost the whole production capacity of the plant has now been taken up, still more additions are being made.

The company states that one of the busiest of its departments is the Getefo division (short for Gesellschaft Fur Technischen MBH of Koblenz — the Phoenix Associate in Germany). This department makes rubber-to-metal bonded anti-vibration units which claim to avoid costly and extensive foundations for heavy machinery, which can then be moved freely from place to place. Using such mountings, Phoenix were able to install at their own factory a 22 ton mill on a 5in. bed of concrete — compared with the 4ft. 6in. usually necessary for such an installation. Phoenix lowered the mill on to a number of carefully-sited and aligned Getefo mountings, and they claim that, given the 'know-how', engineers in any ordinary factory can do the same.

Another department said to be working at full stretch is that which produces Phengard — flooring with the anti-static properties that are essential in any building where static electricity might build up. Phengard includes tiny particles of carbon-black which are evenly distributed throughout the 'mix'. These particles attract the static, guide it to a 2in. strip of brass foil laid under the flooring and the foil, in turn, conducts the electricity harmlessly to earth. It is being used more and more as flooring for the operating rooms of hospitals and in Ordnance factories in this country and abroad.

Pirelli Exports Record

Tyres, footwear and resilient webbing made at the Pirelli Ltd. Burton-on-Trent factory have earned Britain over £1m. this year. 'Our exports for the year ended September 30 are a record £1,042,000', R. W. P. Hotoph, export manager of Pirelli Ltd. announced in London recently. 'Tyres accounted for nearly three-quarters of the total and were exported to 60 sterling area countries. We also earned over $600,000 through our sales in the USA and Canada and nearly £50,000 through sales of footwear overseas. Our exports from Burton-on-Trent have quadrupled in the past seven years'.

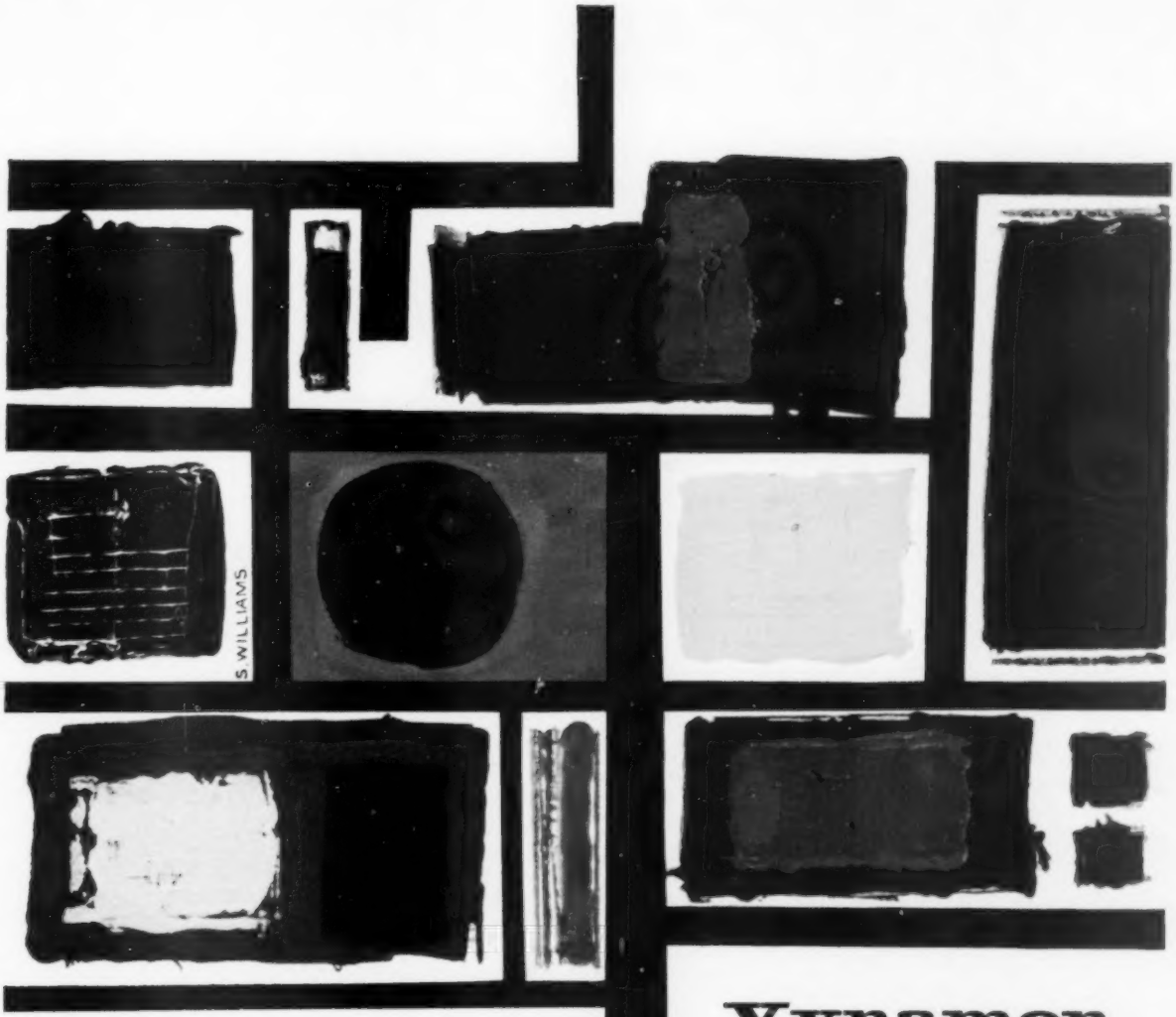
Expanding markets for Pirelli tyres and webbing are Australia and the Scandinavian countries, where furniture manufacturers are changing over more and more to resilient webbing.

MacLellan Forms New Company

GEORGE MacLellan and Co. Ltd., the Glasgow rubber firm, has acquired the minority interest in Cochrane Protective Clothing Ltd., the name of which, as a wholly-owned subsidiary of the parent company, is being changed to MacLellan-Cochrane Ltd.

The existing garments division of George MacLellan and Co. has been amalgamated with the new company to form one unit capable of manufacturing the whole range of waterproof and protective clothing. The board of directors remains as before with the addition of D. M. Lean, development director of George MacLellan and Co. The company states that it is intended to continue manufacture on the same lines as before, but with the advantages of integration and centralized management.

Employing 120 people, the new company manufactures protective clothing for many local authorities, police forces and fire services in the UK and overseas as well as for the constructional and other industries.



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C

Physical Testing of Foams — I

ABSENCE OF RECOGNIZED PROCEDURES MAKES COMPARISONS DIFFICULT

THE standardization of test methods for polymers has taken a considerable time in becoming established. Many of the tests that have been used to test solid polymers are largely adaptations of tests originally evolved for testing metals, wood and textiles. The number of British Standard specifications available today indicate that this state of affairs no longer exists and many tests have been specifically developed for polymers. Unfortunately, the number of specifications available for the low-density materials are very few in number, although it is hoped that this will soon be remedied.

The absence of recognized test procedures makes it difficult to compare the relative properties of many of the low-density materials. By low-density materials it is inferred that the materials consist of discrete cells fused together forming a cellular structure. Testing authorities outside this country have produced various specifications covering foamed materials. (It is now proposed to use the word 'foamed' to describe all the low density polymeric materials.) Included among these testing authorities are the American Society for Testing and Materials (ASTM), the Germany body Deutscher Normenausschuss (DIN) and also in the US the Society of the Plastics Industry have drawn up a specification describing the methods of test for cellular materials.

These low-density polymers are described by a variety of terms such as cellular, expanded, sponge and foam. These terms have come from the rubber industry and are defined in BS 903.

Cellular Rubber

Vulcanized rubber consisting of a series of thin-walled cells filled with either air or other gases. These may be all completely non-intercommunicating, all cells communicating with one or more of the adjacent cells or partly intercommunicating. The walls of the cells may be vulcanized to the soft rubber stage or completely through to the hard stage.

Sponge

Cellular rubber made from masticated raw rubber and in which the cells are all intercommunicating or partly intercommunicating and partly non-intercommunicating.

Expanded

Cellular rubber made from masticated raw rubber and in which the cells are substantially non-intercommunicating.

Latex Foam Rubber

Cellular rubbers made directly from liquid latex and in which cells are all intercommunicating or partly intercommunicating and partly non-intercommunicating.

These definitions are now used for plastics and many of the terms used today to describe low-density plastics are incorrect if the BS 903 definitions are adhered to strictly. However, many of these terms are now used interchangeably to describe these materials and it is not unusual to see low-density polystyrene referred to as expanded, foamed or even cellular.

Although these terms are used interchangeably there is, however, a demarcation in this group of materials. The low-density polymers may be classified into flexible or rigid and open-cell or closed-cell materials.

General Properties

The properties that are normally evaluated to ascertain the quality and suitability of a polymer are as follows:

Density

This is a very important property of the low-density polymers mainly because it is the basis on which they are sold. Many other properties are governed by density and it has been found that properties such as flexural and compressive strength, increase with increasing density of rigid foamed polymers. This can be seen from Table 1, which shows the relationship between density and these properties.

Because of entrapped air it is not possible to measure density by normal displacement methods based on Archimedes principle. The technique commonly adopted is to weigh a rectangular block of the foam whose dimensions are accurately measured.

TABLE 1
THE VARIATION IN PROPERTIES WITH DENSITY OF FOAMED POLYSTYRENE

Density lb./cu. ft.	*Compressive Strength lb./sq. in.*	*Flexural Strength lb./sq. in.*
1	18	30
2	36	60
3	55	88
4	75	120
5	95	150
6	118	180

Hardness

This property is not normally measured for rigid foams although it is of some interest with respect to the flexible materials. This property may be defined as the resistance to deformation and is a complex property. On determinations by indentation or penetration methods other factors such as yield strength, plasticity and elastic modulus are involved. Tests have been evolved specifically for the flexible low-density materials and one independent test authority has developed an indentation hardness index. This may be defined as the load in kg. required to produce an indentation in the sample equivalent in depth to 40% of initial thickness of the sample under specified conditions.

Thermal Properties

Measurement of coefficients of expansion and specific heats for foamed materials are quite normal but it must be remembered that the coefficient of expansion should be defined as the *reversible* increase in length/unit length/unit temperature rise and that when quoting specific heat, the temperature of measurement must be stated. (See Tables 2 and 4.)

Thermal Conductivity

The conventional solid polymers are relatively poor conductors of heat but on being converted to low-density

TABLE 2
PHYSICAL PROPERTIES OF FOAMED POLYMERS

	Density lb./cu. ft.	*Specific Strength per ft.*	*Tensile Strength psi*	*Flexural Strength psi*	*Compressive Strength psi*	*Coefficient Expansion per °F. × 10⁻⁶*
Polystyrene	1–5	0.25	30–20	25–180	12–50	2
Butadiene/styrene	4.5	0.12	80	—	40	—
PVC	3–5	0.25–0.5	100–400	25–200	40–250	3
Polyurethane	1.5–8	0.1	20–50	150	85–125	3
Cellulose acetate	7	0.1–0.15	110–180	70–180	—	2.5
Ebonite	4–6	0.05	30–50	30–50	40	3
Phenol/formaldehyde	2–18	0.05	15–20	20–100	8–40	5
Urea/formaldehyde	3–10	Low	Low	Low	25	5
Epoxy	5–20	0.07–0.12	50–350	200–500	15–600	3

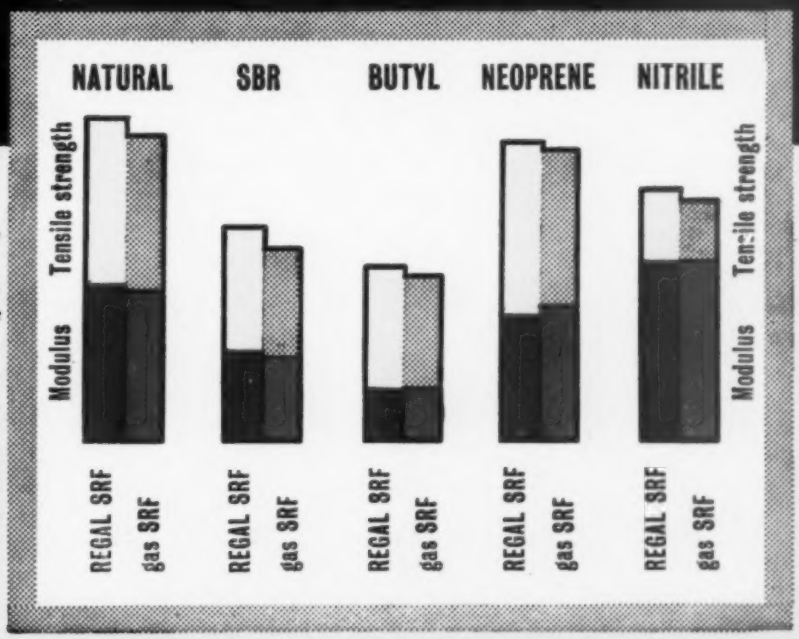
Q A CABOT

SRF Black from oil?

SRF

FACTS

REGAL SRF is produced by the new REGAL process — patents applied for — permitting the control of structure at various particle size levels, from oil. Its Particle Size and Surface Area are close to those of PELLETEX and STERLING S. Cabot's long established American gas-SRF blacks. REGAL SRF provides physical properties and processing characteristics typical of gas-SRF types:—



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polymers either by chemical or mechanical means, they exhibit low thermal conductivity values. This is largely due to the fact that still air, which has a 'K' value of 0.19B.tu.in./ft.²/hr./°F., is entrapped in the structure.

This property is becoming increasingly important for foamed polymers due to their increased consumption for building and thermal insulation. It is easy to realize the importance of this property on examining the fact that approximately 75% of the total rigid foamed plastics production in the UK is used for thermal insulation. The determination of this property is adequately covered in BS 874:1956.

The thermal conductivity of foamed polymers may vary not only with density but with the mean temperature of test. (See Table 3.) The lower the density of a material, the lower will be the thermal conductivity. 'K' values for various foamed polymers are listed in Table 4.

TABLE 3
THERMAL CONDUCTIVITY OF FOAMED POLYSTYRENE
(Density 1lb./cu. ft.)

Mean Temperature °F.	*'K' Value BTU in./ft.² hr. °F.*
50	0.24
0	0.21
–27	0.19
–40	0.18
–126	0.14

TABLE 4
THERMAL PROPERTIES OF FOAMED POLYMERS

Material	*Specific Heat at 23°C.*	*Thermal Conductivity BTU in./ft.² hr./°F.*
Polyurethane	0.29	0.24
(Freon blown)		0.16
Ebonite	0.33	0.2
Polystyrene ..	0.29	0.2
PVC	0.32	0.2
Cellulose acetate	0.36	0.3
Rigid silicone ..	0.3	0.6
Phenol-formaldehyde ..	0.37	0.28
Urea - formaldehyde	0.4	0.23
Epoxy resin ..	0.28	0.3

Temperature Resistance

Temperature resistance, or dimensional stability, may be measured by making two marks on a test specimen of known dimensions, at a given distance apart. The sample is then placed in an oven and heated to an arbitrary elevated temperature (say, for foamed pvc 55°C. and for foamed polystyrene 80°C.) for a given period of time.

The dimensional stability can then be determined on removal from the oven by calculating the percentage change in length between the marks before and after testing.

Low-Temperature Flexibility

This test is measured as follows: test pieces of dimension 6in. x ¼in. x ¼in. thick are cooled in 5° stages (usually by using solid carbon dioxide) until fracture occurs when wrapped around a ¼in. diameter mandrel. The low temperature flexibility is taken to be 5°C. above the temperature of fracture.

Water Resistance

A low value of water vapour permeability is an important requirement of a foam if being considered as an insulation material. A method for measuring this property is contained in The Packaging Code BS 1133: 1952, Appendix E. This method was originally devised for thin films but has been successfully applied to foamed polymers up to a thickness of at least 1in. This test, of course, bears little significance for the flexible open-cell materials and is essentially for closed cell foams. Table 5 lists the values for various foams.

Water Absorption

This is a measure of the amount of water absorbed for a given time by a sample of known dimensions and is expressed as a percentage of the initial dry weight. This property, like water vapour permeability, has no significance for open-cell foams and its value in rigid closed-cell foams is at times suspect due to variations in surface finish, etc. Values for water absorption of various foams are given in Table 5.

Flame Resistance

The exact definition of fire resistance is not altogether clear and many authorities have different views. The following suggested definitions seem the most likely ones to be universally accepted.

(a) Fire Resistant—the ability of a material to stop the penetration of a flame.

(b) Flame Spread — the spreading of a flame over the surface of a material due to its ability to burn when in contact with this flame.

(c) Self-extinguishing — the ability to stop burning immediately when a flame is removed from an article.

(d) Non-burning — incapable of combustion.

The flame resistance of foamed polymers may be measured according to BS 476:1953 which describes two tests suitable for the evaluation of low-density polymers — combustibility and surface spread of flame.

A material may be described as combustible if during the test any of the specimens (i) flames, (ii) produces vapours which ignite, (iii) causes the temperature of the furnace to be raised 50°C. or more above 750°C.

A test that is of some interest is described in literature and utilizes a bunsen burner to produce a red spot (1,300-1,310°F.) on an inclined iron plate. A pilot light, 1in. vertically above the plate is regulated to give a burning flame of 1in. long to ignite the vapours given off by the hot sample placed on the hot plate.

The following are measured: (a) ignition time — time required to produce continuous burning, (b) burning time — time in which active burning continues, (c) percentage flame travel — percentage (inches) of the exposed surface consumed or charred by the flame.

From these can be calculated: rate of burning $y = c/b$ and flammability rating $= 10y - a + b - 30$.

This is an arbitrary rating and may be adapted to test many types of polymers.

Table 6 lists the maximum working temperature of various foams as well as their degree of fire resistance.

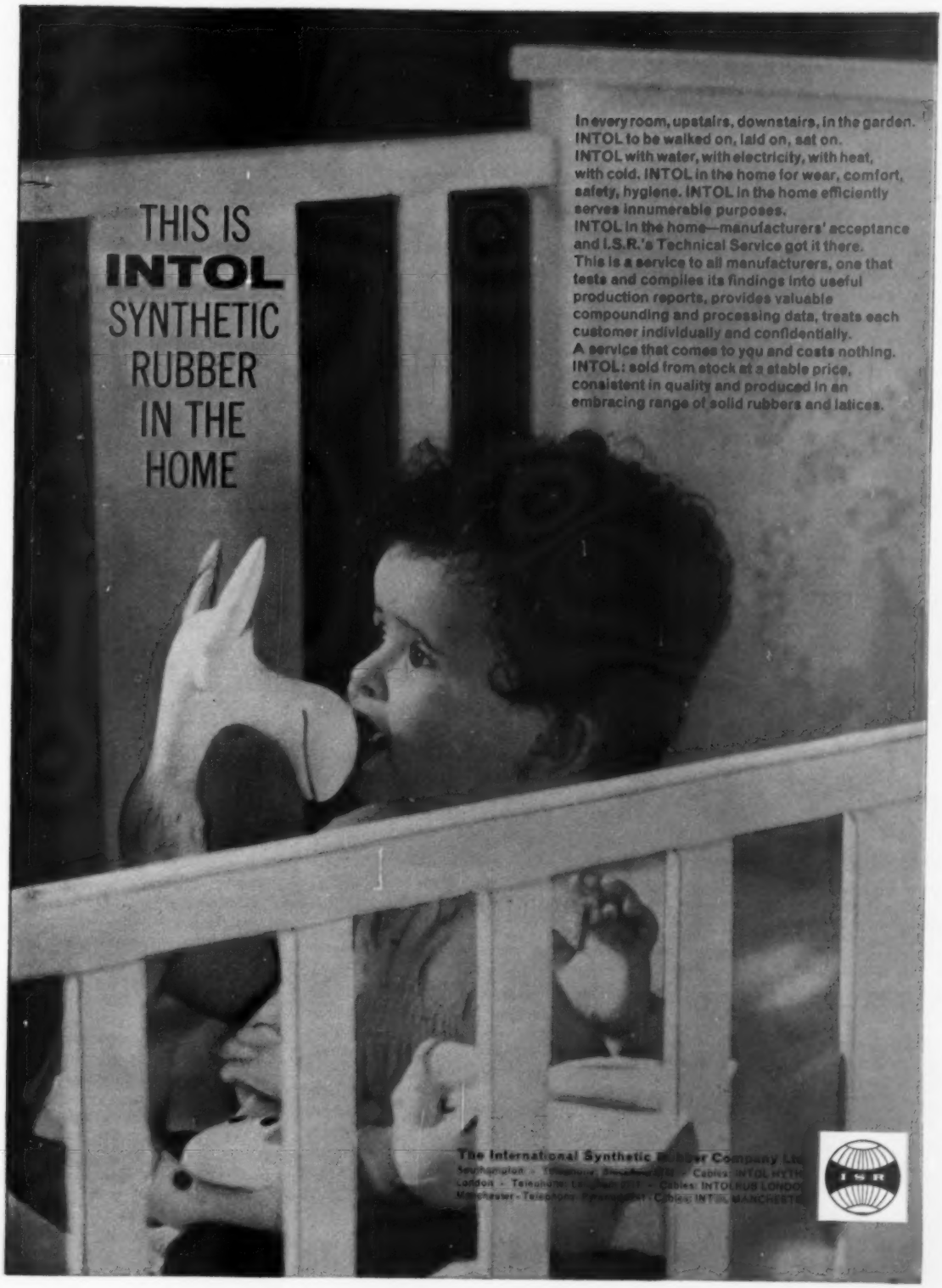
This article will be concluded next week.

TABLE 5
WATER VAPOUR PERMEABILITY AND WATER ABSORPTION OF FOAMS

Material	*Water Vapour Permeability grains/hr./ft.²/in. Hg.*	*Water Absorption %*
Polystyrene	1–2	<1.0
PVC	0.5–1.5	1.0
Ebonite	1.6	1.5
Phenol formaldehyde	>3.0	2.5
Urea formaldehyde	>4.0	9.0

TABLE 6
FLAME RESISTANCE AND MAXIMUM WORKING TEMPERATURE OF FOAMS

Material	*Maximum Working Temp., °C.*	*Combustibility*	*Flame Resistance*
Polystyrene ..	75	Softens and burns readily in untreated state	Equivalent to Class 1 of spreader flame test BS 476
PVC..	55	Does not burn without continued assistance.	Self-extinguishing.
Polyurethane ..	150–200	Burns slowly	Can be made self-extinguishing
Phenol formaldehyde	200	Burns very slowly	Class 1 BS476
Urea formaldehyde	100	Burns slowly	Burns slowly
Ebonite	50	Burns fairly quickly	Self-extinguishing
Epoxy	150	Burns slowly	Self-extinguishing
Expanded Neoprene	100	Burns slowly if kept hot	Non-inflammable
Expanded butyl ..	100	Burns	
Expanded silicone ..	400	Burns very very slowly	Self-extinguishing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RMEA SAFETY STUDY CONFERENCE

Guarding of Rubber Machinery

'MACHINES SHOULD BE ADAPTED TO MEN—NOT VICE-VERSA'

'THERE must be more interchange of ideas [on safety] and great stress must be laid on designing for safety', said Ernest Morris at the recent safety conference of the Rubber Manufacturing Employers' Association. Mr Morris, chairman of the RMEA engineers' advisory committee was speaking at a symposium on the guarding of rubber machinery — one of the main sessions of the conference.*

Running Nips

Mr Morris also referred to the importance of training young people entering the industry, before introducing the first speaker, R. J. Happer (chief engineer, Firestone Tyre and Rubber Co. Ltd.).

At Southport: the RMEA Engineers' Advisory Committee. *Front row, left to right:* **G. A. O. Ross (chief engineer, Wm. Warne), A. W. Dickinson (chief engineer, Geo. Angus), Ernest Morris (chairman—chief engineer, Greengate and Irwell), R. J. Happer (chief engineer, Firestone Tyre) and H. Mead (chief engineer, Avon).** *Back row:* **H. J. Randall (plant and services engineer, Dunlop) and J. W. McKittrick (safety officer, BTR)**

Mr Happer, dealing with 'Running Nips', referred to the basic work on the subject — 'Running Nip Accidents', NJIC, 1959 — saying that much greater use could be made of the important information it contained. Running-nip accidents were on the increase since the publication of that book — an average of 16.6 accidents per year for the period 1948-1955 had now increased to an average of 30.5 annually during the period 1956-1959.

Mr Happer continued at length on the value of 'photo-electric' cell devices and 'ultra-sonic' devices for this type of hazard. He illustrated his points by slides showing machines actually guarded by these devices and found to be perfectly satisfactory under working conditions. The advantage of the ultra-sonic device, he said, was that it continued to be effective in a dusty atmosphere and was not triggered off by dust or dirt.

Mr Happer thought that some of the reasons for the increase in accidents due to this cause were:

(a) Faster operation of machinery from 1955 onwards. (b) Reduction in older experienced employees through retirements. (c) Increased conveyorization and mechanization in all factories. (d) Changes in materials and methods — synthetics, temperatures, tacky stock. (e) Trip switches and safety devices being circumvented. (f) Inadequate or unsuitable guards producing mainly nuisance value. (g) Operators not replacing guards after repairs and adjustments to machines. (h) No developments to improve guarding and little interest in safety.

Following group discussions, Mr Happer, in reply to a number of questions, agreed that a more detailed analysis of 'running nip' accidents giving particulars of machines on which they had occurred and the type of worker involved could be useful. It was usual for the user of the machine to fit the interlock devices, but he had no doubt that it would be better that this feature should receive attention at the design stage. Thus it was up to the buyer to specify precisely what he required so that the machinery supplier could build it into the machine. One outstanding advantage of the ultra-sonic beam type of trip was that it did not become ineffective when covered with chalk or dust as did the light beam type working on a photo-electric cell.

General Rubber Goods Machinery

H. Mead (chief engineer, Avon India Rubber Co. Ltd.) referred to the NJIC publication 'Studies of Accidents in the Rubber Industry' in his talk on general rubber goods machinery. He reiterated that the object of these studies was to give the facts and to hope that on these facts people would start thinking.

He said that, in the production of general rubber goods, a great variety of products were manufactured using a great variety of machines. Other speakers in the symposium would deal with some types in greater detail.

There were two common factors in accidents involving machines — (a) time saving, (b) convenience. These factors must be borne in mind by the plant engineer when ordering or designing machines. Machines should be adapted to men and not *vice-versa*, as usually happened. This was what he considered was now called 'ergonomics'.

The speaker suggested that people should get away from the conventional idea of protection by wrapping a piece of metal around the machine in such a manner as to prevent access, and made some suggestions to this effect.

Discussion followed on how to ensure operators were fully conversant with all guards and their functions and it was agreed this was a problem of communication and training. It was stressed that good design should cater as far as possible for all operators and the guarding of two-roll mills was cited as an example. Here it was made clear that safety was only obtained by the proper combination of man and machine. The machine, safe at one time with a particular operator, could become an unsafe

* Opening addresses at the conference, which was held at Southport, were reported in *RPW*, November 25, 879.

machine with some other operator of longer reach. The desirability and problems in the complete enclosing of presses were also given attention. Reference was made to presses so guarded actually working in production in the industry. Finally, it was agreed that the best guard design did not depend on the full co-operation of operators to be fully effective.

Two-Roll Mills and Calenders

G. A. O. Ross (chief engineer, Wm. Warne and Co. Ltd.) began his paper on two-roll mills and calenders by outlining the Lunn principle of guarding mills. He said that while this was readily applicable to large mills, it was extremely difficult on mills of smaller diameter. Particular difficulty was encountered in maintaining the safety limit with electro-mechanical brakes. Plug braking, although more expensive, was much more reliable. In small diameter mills the limits were fine, and proper maintenance became of absolute importance, stressed Mr Ross. Trouble could also arise due to lost motion in the links. It was preferable that a knock-out switch should be provided on either side of the machine instead of at one side only.

He gave details of a principle which his firm had adopted on small mills, called the Ross-Warne mill. It adopted the Lunn principle but the two rolls of the mill were inclined at an angle of 30° instead of being horizontal. This meant that the axis of the back-roll was dropped below the axis of the front roll, thereby giving greatly increased accommodation. This enabled much greater variations in the physical characteristics of various operators. One of the great difficulties a mill manager was faced with was when a normal operator did not turn up for work, and the only alternative was a man of very different physique.

The paper was accompanied by sketches showing the conventional mill, the Ross-Warne mill and also an illustration of calenders, the feeding points of which were fenced by means of a grill into which the rubber was dropped and was threaded into the bowls by means of pokers. He referred to the application of the Lunn principle to calenders, and thought this should receive much more consideration.

In reply to questions Mr Ross stated that adjustable safety bars and working levels were open to far too many risks and should be completely avoided. Limited reversing was desirable in his opinion although opposite opinions obtained — no doubt for good reasons. He had found laboratory workers very loath to fit proper guards on small laboratory mills but considered that these mills could be guarded to complete safety and be used just as conveniently and effectively as unguarded. A 'doctor' could be fitted to the back of a Ross-Warne mill to clear the back roll, and if it was thought necessary for the operative to see into the nip, a mirror could be erected over the machine.

Footwear Machinery

Speaking on footwear machinery, J. W. McKittrick (safety officer, BTR Industries Ltd.) referred to statistics in the Chief Inspector of Factories report for 1960. In footwear factories the statistics showed there were 677 reportable accidents, 262 of which were on power-driven machinery: furthermore, that 393 of them were to hands and wrists.

He discussed revolution presses — which cut all types of process fabric. A loose knife was placed upon the material, the operator depressed the clutch and the top beam of the machine descended. Accidents occurred between the beam and the top of the knife. Mr McKittrick made the following points: The machine should be single stroking and there should be a brake to bring it to rest at tdc.

It should have a stop to prevent over-run and means of locking the clutch when the machine was not in use. It should also be provided with two-hand controls. He stressed the necessity of brake maintenance and the importance of having wide flanges around the tops of the loose knives to prevent part of the hand inadvertently coming between the beam and the top of the knife.

Mr McKittrick called the clicking press 'the little brother of the revolution press'. Its problems were identical and similar precautions should be taken.

Dealing with the rubber boot industry he referred to conveyors used in mechanized lines. Stop and start buttons were necessary at strategic points. The presses used for assembling the completed boot should be protected by an interlocked guard which prevented the press operating until the guard was pulled down.

Discussion mainly centred on making information about safety devices for these machines available throughout the industry. It was felt that the engineers' advisory committee could do valuable work in this field.

Tyre Making and Vulcanizing Equipment

H. J. Randall (plant and services engineer, Dunlop) commenced his paper on tyre making and vulcanizing equipment by quoting accident figures for these types of machine during 1960 and divided them fairly equally into two categories (a) caused by faulty machine, (b) instituted by the operator.

Of 18 serious accidents 15 were on building machines and three on curing. Over the past few years building machines had caused most of the accidents and efforts to increase production had led to the development of more complex types. Principal hazards were: (1) Trapping due to sliding mechanisms. (2) Nip incidence due to friction wheels. (3) Out-of-sequence operation, and (4) Collisions during servicing operations.

The speaker concluded by stressing the importance of maintaining the machines and safety devices — a problem he thought likely to become even more complex in the next few years.

Discussion followed on accidents due to mould stops put at conveyors, Mr Randall suggesting that it was best to obviate stops and have an arrangement to arrest the mould as it came round. Better liaison between buyer and foreign supplier was discussed and the speaker stated that the buyer should state his requirements when he placed his order — this was

Arnold Babbage, secretary of the RMEA, with Ernest Morris, chairman of the Engineers' Advisory Committee, at the Southport conference

applicable to both British and foreign suppliers.

The problem of poker bars and the tendency for them to stick was considered; it was agreed this was usually due to inadequate maintenance. Mr Randall was very definite that open solvent cans should not be used. They should be replaced by safety-type containers. Asked about safety devices on 'Bagomatic' machines, the speaker stated that a strain gauge switch to prevent the press opening if the pressure was too great, had been known to fail due to lack of maintenance.

Hose-Making Machinery

A. W. Dickinson (chief engineer, Geo. Angus and Co. Ltd.) restricted his paper on hose-making machinery to actual hose building machines, omitting preliminary preparation processes. The basic machine consisted of a long mandrel around which was wrapped fabric or braided reinforcement. Other types of machine were similar and required guarding of the same nature. He stressed the necessity of the guards allowing the operator to carry out all his functions without increasing the time factor.

Fixed guards, which should be most effective, are very difficult to apply to these machines. Interlocking guards can be used but they can present greater danger if not properly designed.

He discussed automatic guards, the principle of which was that the machine comes to rest if an operator moves into the danger zone. In this category he mentioned the use of photo-electric cells running the whole length of the machine which might be as much as 60ft. long. If an individual interrupted the light curtain the machine was brought to rest.

During discussion Mr Dickinson stated that cone-shaped guards with interlocking sections were the best method of guarding horizontal braiding heads — bearing in mind that the operator must have access to all parts of the machine for the purpose of changing bobbins, etc.

He considered that lighting was important, and too often left to chance. Methods other than using photo-electric cells were discussed as a means to guarding hose building machines, but it was felt that the length of these machines made other methods impracticable. Handling of mandrels was also considered as a serious source of accidents and the speaker stated that the problem of handling and storing must be solved individually within the factory.

Reports on other papers delivered at the conference will appear in future issues of RPW.

Boat in a Parcel

FABRICATED FROM HIGH-IMPACT PVC

A NEW plastics runabout boat was recently demonstrated by F. A. Hughes and Co. Developed in conjunction with British Geon Ltd., the 13ft. Pack-a-Boat folds to a parcel only 6in. deep.

It is made of a high-impact pvc sheet for which no moulding is required, the panels being cut to size with the simplest tools. Joints are made of neoprene. The low coefficient of friction offers less resistance to movement through the water than wooden structures.

The commercial advantages of boat construction in rigid pvc are stated to be: faster rate of production; elimination of many secondary operations such as the manufacture of individual items — keel, hog, stringers, etc.; elimination of mechanical fastenings; general all-round reduction in labour costs.

Buoyancy Tests

The basic price of a timber boat in the UK is about £5 a ft. unpainted. At present, a finished boat in pvc sells at a price some 20% above this or about £195. The weight of the boat is 170lb. complete, a saving of 25% over similar wooden designs.

In some recent tests, a 14ft. 6in. punt, was found to have a positive buoyancy of 683lb. During tests this punt was filled with water (equivalent to a weight of 2,197lb.) and still had 3½in. freeboard. With two men aboard (bringing the total weight to an equivalent of 2,513lb.), 2in. freeboard still remained. With three men aboard and the gunwhale awash, the boat stayed safely afloat. In effect, this means that the boat is virtually unsinkable as far as everyday use is concerned. Dinghies (7ft. 6in.) carrying a payload of about 500lb. have been tested with a outboard motor attached to the transom without any effect whatever on the structure.

Changes at Courtaulds

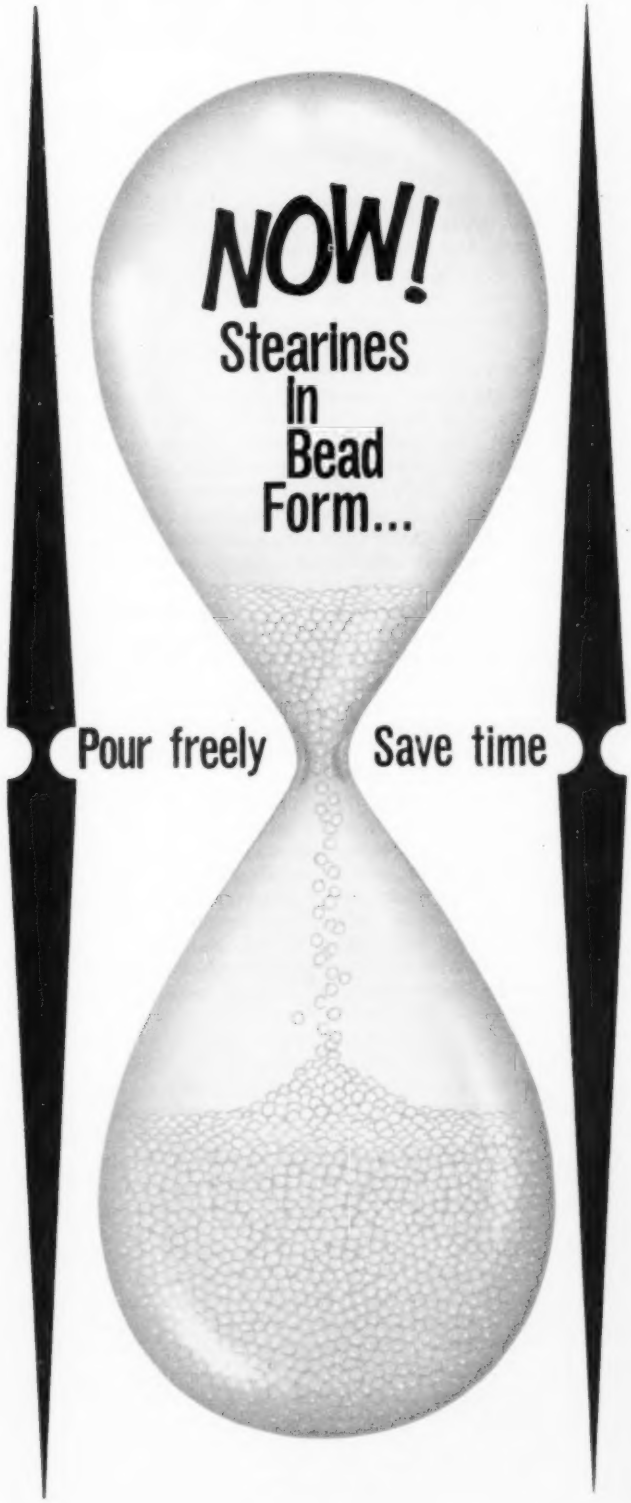
Courtaulds is to start closing down British Enka's tyre yarn production at the end of February 1962, and the cellulose film unit will stop production at once. Nearly 1,000 workers will be affected by the decision.

In an announcement, Courtaulds state that it would also be necessary to continue reduction of the research and administration staffs wherever there was duplication between the firm and Enka's.

Courtaulds will continue textile yarn production, yarn processing and tyre fabric manufacture at British Enka's factories at Aintree and Bolton, but after February, 1962, Aintree tyre yarn production will be switched to Courtaulds other tyre yarn factories in the United Kingdom at Preston, Wolverhampton and Carrickfergus.

These plants have been re-equipped with the latest machinery to produce the higher strength tyrex yarns for which there is an increasing demand from tyre manufacturers. Preston is one of the largest rayon tyre yarn factories in the world.

The 13ft., 5 6-seat, pvc Pack-a-Boat that can be used with outboard engines ranging from 3 to 25hp. It can be folded to a parcel 6in. deep and easily carried on a car roof *(see inset)*



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VIEWS and REVIEWS

The Polyurethanes

OTTO BAYER started something. The tangible results of his researches into the reactions of the isocyanates are to be found everywhere, from the sixpenny stores to the space missile. Over the last few years, the urethanes have had a good press; the latest are not the least interesting.

Bayer and his co-workers began with polyesters from which techniques were developed for casting solid elastomers and for preparing elastic, rigid, and in-between foams. This was followed by both solid and cellular elastomers using polyethers, the process being first based on a partially-reacted pre-polymer but latterly on a one-step process (sometimes misleadingly called a 'one-shot' process).

The polyurethanes are in themselves the result of a complicated reaction, or rather series of reactions, in which chain propagation through the formation of urethane and substituted urea groups, is followed by cross-linking of several kinds, biuret, allophanate, trimerization. The relative speeds of the various reactions, controlled by a number of additives, is one of the factors in producing a material with given properties.

If to these variables be added the possibilities introduced by a variety of polyethers and isocyanates, it will be understood at once that a tremendous range of urethane products is possible, and a complete understanding of the polymer chemistry of the urethane reactions is a life's study in itself.

Polymer in One Step

It is somewhat of an historical accident that the technical centre and authority in this branch of chemistry has moved within the last few years from Germany to the US. The Bayer Co. got rather tied up with the polyester method at a time when others of the polypropylene glycol type were becoming available and were producing elastomers with physical properties more nearly related to those of natural rubber. In this situation, the Wyandotte Chemicals Corp., manufacturers of polypropylene glycol, decided to devote considerable research resources to the ether-isocyanate reactions and, as a result, has become a world authority on the subject.

The latest publication of their technologists is entitled 'A One-Shot Method for Urethane and Urethane-Urea Elastomers' and appears in *I/EC* for November 1961, Vol. 53, No. 11, pp. 889-894. The authors are Axelrood, Hamilton, and Frisch.

As they say: 'the key to the successful preparation of the elastomers described in this article is the use of selected catalysts for the isocyanate-hydroxyl reaction to provide rapid polymer chain build-up with suitably spaced cross-links'. One of the main factors is the relative speeds of the reactions, and they have found that it is the metal-organic catalysts, such as stannous octoate and dibutyl tin dilaurate, which give the best balance of speeds.

In this paper, they report on many other variables such as molecular weight of the polyether, isocyanate-OH ratio, and amine combinations.

The one-step technique makes possible a much simpler casting technique for shoe soles and heels, solid tyres, gaskets, thread, and coatings.

Curing by Moisture

'Urethane Coatings for Rubber Products' is the title of a paper by H. Earl Hill in *Rubber Age* for September 1961, Vol. 89, No. 6, pp. 979-987. By the use of a pre-polymer in a mixture of solvents, a coating can be brushed, sprayed, or dipped on a rubber product and, by heating in a moist atmosphere, can be cured sufficiently to permit shelf curing at normal temperature in a day or two. Addition of a catalyst will further accelerate the reaction.

The coatings protect the rubber beneath from attack by ozone, oil, and certain chemicals, help abrasion resistance and surface friction. The article discusses the attainment of the desired degree of adhesion and elongation, and also has some suggestions about the 'molecular fit' of the urethanes on substrates like nylon.

Clothes and Carpets

Urethane foams have opened up new lines in the backing of fabrics of many kinds, giving rise to the name 'foambacks'. For most of this year, the monthly issues of *Skinner's Silk and Rayon Record* have had a lot to say about foambacks, and the September number was specially devoted to the subject, beginning with its editorial headed 'Guide to a Chain Reaction', in which it prophesized next spring as the deciding time for foambacks because then the ordinary consumer will become aware of them for the first time.

In that issue (Vol. 35, No. 9) there is a description of the I.C.I. adhesive combining process, an exclusive report on the foamback position in the USA, and a guide to the British foamback trade, giving suppliers of foam, combiners, machinery makers, suppliers of adhesives, and makers of fabrics.

Carpets backed with polyester urethane foam sheet, about ¼in. thick and of a density between 0.040 and 0.045, are already in commercial production in Britain. *Skinner's Silk and Rayon Record* for November 1961, Vol. 35, No. 11, pp. 1122 and 1123, describe this process using I.C.I. adhesives. It also discusses, or at least advances a reason, why foaming *in situ* has not proved successful as a carpet backing.

The article ends with an interesting suggestion about the advantages of sealing the undersurface of the foam backing.

Nips and Quips

I often must pass over a paper, with regret, because I have no space. Some I have tried to save by what I call nips — noted in passing — a list of titles, authors, and references with the barest of comments. My function,

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

however, as I see it, is to gather in a somewhat wider field than the professional information officer, and to present the goods a little differently.

For this reason, I need in my readers two chief characteristics: a buttonhole and an eye for a pleasant flower to put in it. During this year there are many such people all over the world who have written words of encouragement, comment, and stimulation.

For them, from the papers I am forced to discard, a quotation will often serve better than a review. From the flower, they can judge the plant. Better, then, than nips will be quips — quotations in passing. Here are a few.

In 1675, Thomas Sprat wrote a history of the Royal Society, in which manifesto he set out the language in which this new intellectual discipline of science ought to be communicated. I quote a few sentences which have force three hundred years later and may, as I hope, send the curious back to the original.

A Close, Naked, Natural Way of Speaking

'How many rewards, which are due to more profitable, and difficult *Arts,* have been still snatch'd away by the easie vanity of *fine speaking?* For now I am warm'd with this just Anger, I cannot with-hold myself, from betraying the shallowness of all these seeming Mysteries; upon which, *we Writers,* and *Speakers,* look so bigg. And, in few words, I dare say; that of all the Studies of men, nothing may be sooner obtain'd, than this vicious abundance of *Phrase,* this trick of *Metaphors,* this volubility of *Tongue,* which makes so great a noise in the World. But I spend words in vain; for the evil is now so inveterate, that it is hard to know whom to *blame,* or where to begin to *reform*'.

'It will suffice my present purpose, to point out, what has been done by the *Royal Society,* towards the correcting of its excesses in *Natural Philosophy;* to which it is, of all others, a most profest enemy. They have therefore been most rigorous in putting in execution, the only Remedy, that can be found for this *extravagance*: and that has been, a constant Resolution, to reject all the amplifications, digressions, and swellings of style: to return back to the primitive purity, and shortness, when men deliver'd so many *things,* almost in an equal number of *words.* They have exacted from all their members, a close, naked, natural way of speaking; positive expressions; clear senses; a native easiness: bringing all things as near the Mathematical plainness, as they can: and preferring the language of Artizans, Countrymen, and Merchants, before that, of Wits, or Scholars'.

Crisis and Communication

From chapter 1 of a new Pelican Book (4s.) by William S. Beck, who is Assistant Professor of Medicine and Tutor in Biochemical Sciences at Harvard University, called 'Modern Science and the Nature of Life', I take the following. Almost every part of the book is quotable, is distinguished by an exceptional elegance of style and language, and is of prime interest to every educated mind.

'It is commonly said that ours is an age in crisis . . . crisis has been the ever-present human condition through history . . . our crisis is the crisis of transition between two worlds. . . . This book is being written in the belief that science and scientific methods are the best means available to us for solving the problems of our cultural crisis. Science is, beyond question, the outstanding feature of modern civilization'.

'One of the difficulties is what seems to me a failure in the techniques of education. Educationalists have failed to explain science and propagate its broader meanings. . . . Scientists, too, must understand their culture, they must lead their fellow men to the light'.

'Obviously, the scientist's symbols and vocabulary are partly to blame for the great "abyss" that isolates the expert. . . . I am certain, however, that exposition is possible without them. . . . I have no illusions about the difficulties . . . there are certain dangers in believing that all the mysteries of science can be made clear if only the scientist will take the trouble to explain himself in very simple terms. However, I don't think one should underestimate the intelligent citizen.

A Sequence

The subject of one part of this excellent book was also taken by Dr George Beadle, Professor of Biology in California, for his Granada Lecture last year. It is printed in *Advancement of Science for March* 1961, Vol. XVII, No. 70, and I quote two paragraphs from p. 521.

'As every organic chemist knows, organic molecules are formed through the interaction of inorganic molecules — again when the conditions are right. And as every inorganic chemist knows, elements interact to produce inorganic molecules. Nuclear physicists tell us that elements themselves evolve from simpler elements as a result of processes that are both natural and inevitable, given the appropriate circumstances.

'Thus it is clear that the sequence: hydrogen — helium — beryllium 8 — carbon — oxygen — other elements — water — other inorganic molecules — simple organic molecules — more complex organic molecules like nucleotides, amino-acids, and small proteins — nucleic acids capable of replication — nucleic acids protected by protein coats — virus-like systems with protein coats serving catalytic functions — multigenic but subcellular organisms — simple cellular systems like bacteria — autonomous cellular forms like algae — protozoa — multicellular plants and animals and, in our line of descent, man himself — is a natural one that could have arisen by steps no one of which need have been larger than the individual mutational steps we know in today's living systems'.

Riding Over Rubber

When rubber is used in roads it provides only a small percentage of the 'mix' — but the total mileage of roads is so enormous (and ought to be more than that) that the prospective consumption is considerable. The Natural Rubber Bureau is doing much good work in persuading authorities to let us ride over, as well as on, rubber. Its latest publication (Rubber in Roads Bulletin 16) describes the use of a new maintenance treatment — rubberized slurry seal — in South Africa.

CHARLES JENNINGS

MEN and MATTERS

A Review of People and Events

by Peter Richards

IF you had asked The Distillers Co. Ltd. in 1937 for a concise description of its plastics interests, the answer would have been short and precise. The company had just taken over British Resin Products. Factory site (at Tonbridge): six acres. Staff: ten. Output: 20 tons a year.

Today, the answer is not so short; the Distillers Plastics Group factories at Barry, Glamorgan, occupy 200 acres, employ 1,800 people and annual output exceeds 100,000 tons. And this is besides DCL's interests in British Xylonite and British Hydrocarbon Chemicals.

If the answer is not so short it can still be precise, as it is in a new publication describing the group's activities launched last week.

As an industrial group expands there is a tendency for the left hand to know less and less of what the right hand is doing. The booklet condenses the whole general story of the group into 40 pages, and should do an excellent job in answering the many day-to-day enquiries put forward, by trade and governmental bodies, specialist libraries and institutions. I should also think it is a good thing to give a new (or prospective) employee.

Polymer Changes

News from Polymer Corporation has reached me of four senior staff appointments. N. J. McCracken, formerly assistant manager, research and development, who has been associated closely for the past four years with the original research conducted at Polymer on solution polymers, assumes the new post of manager, polybutadiene department. D. E. McLellan, acting manager of the technical division since 1960, who has been with the company since 1943, has held a number of positions in the manufacturing areas, and who, until his most recent appointment, was technical superintendent, rubber department, takes over as manager of the division.

G. W. Ames succeeds Mr McLellan as technical superintendent of the rubber department, and K. B. Jensen, who joined Polymer in 1946, assumes the position of chief instrument engineer.

A recent visitor to Polymer was Dr S. Watanabe of the Hitachi Electric Wire and Cable Co. Ltd., Hitachi-shi, who, as winner or this year's Grand Prix Polysar Competition in Japan, had a two-week stay at Polymer's plant in Sarnia.

The competition is sponsored jointly by the Sanyo Trading Co. of Japan, Polymer's distributor, and Polysar Corporation Ltd., and the award is for the writer of the best Japanese technical paper on the uses of Polysar Rubbers.

Dr Watanabe is the second winner of the award, his subject being 'Water Absorption of Polysar Butyl and its Applications for Submarine Cable'.

Foster M. Stewart (*left*) **is to retire from his position as managing director of the North British Rubber Co. on December 31. He will remain a member of the board of directors and will be succeeded as managing director by E. A. Martin, currently works director**

Sir William Garrett

After 26 years on the board of Monsanto Chemicals Ltd., Sir William Garrett has retired. J. M. Kershaw has been appointed to the board.

Sir William Garrett, who first joined Monsanto in 1917 and was appointed a director in 1935, retires in order to devote more time to his many other interests.

He was president of the British Employers' Confederation from 1958 to 1960 and is the immediate past chairman of the Association of British Chemical Manufacturers.

Mr Kershaw, who is Monsanto's director of production, joined the company in 1946 as a chemical engineer. He was responsible for a number of special development projects, including the construction of the company's Fawley polythene factory.

Educating Education

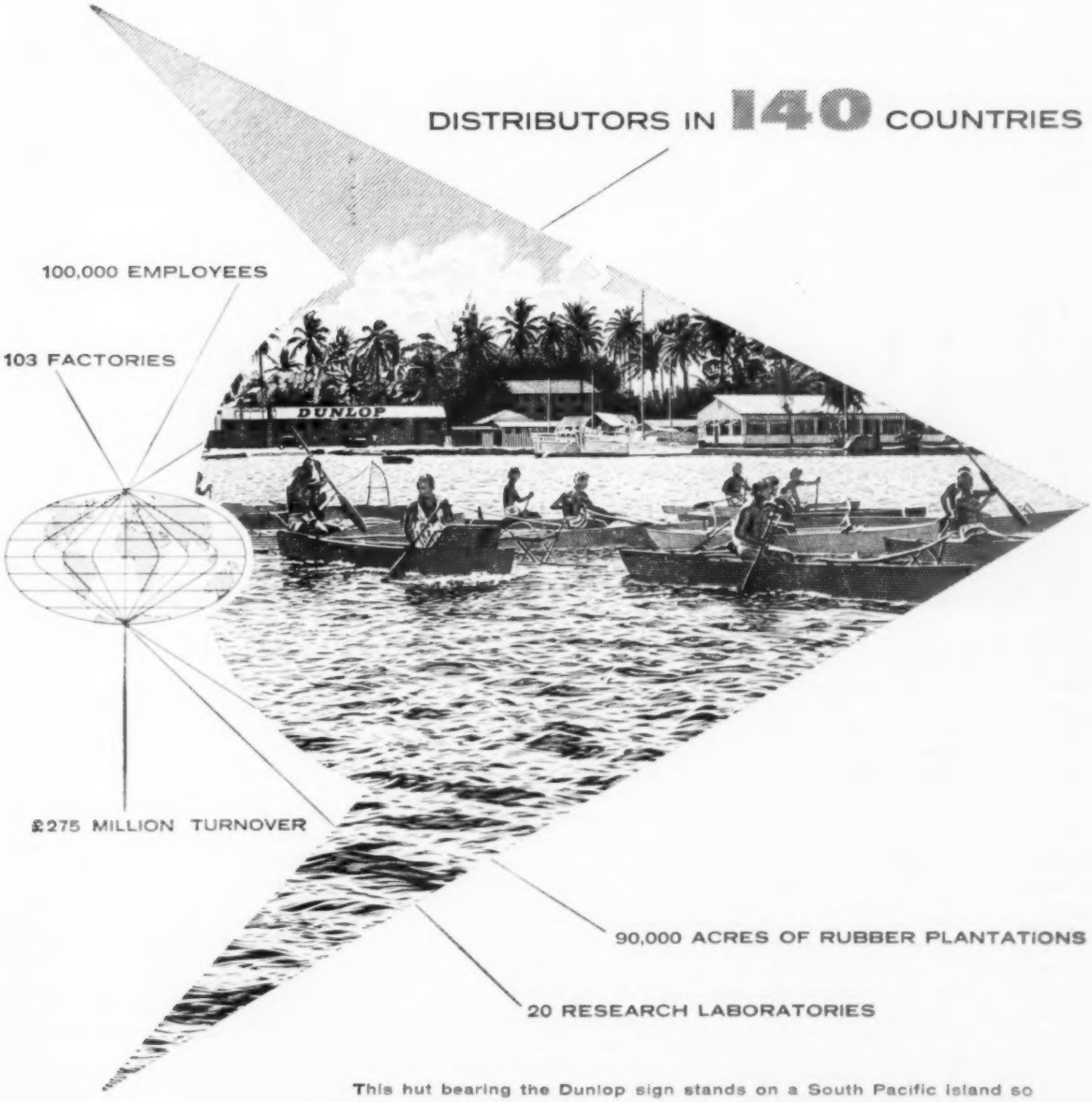
Dunlop in the role of publishers may be thought a little unusual. But as well as producing millions of rubber products, I see from a recent issue of the *Dunlop Gazette* that the company's Educational Section has now distributed more than half-a-million booklets.

Dunlop's education section started just after the war, when requests came in from teachers for information on rubber and rubber products.

For the past five years a different 'project booklet' — such as 'Where Rubber Begins' and 'The Story of the

Watching the curing stage in the production of US Royal tyres are members of the Publicity Club of Edinburgh, which recently visited the Castle Mills, Edinburgh, factory of The North British Rubber Co. On the extreme left is T. W. W. Davie (North British Rubber), who is president of the club

BEHIND THE DUNLOP SYMBOL



This hut bearing the Dunlop sign stands on a South Pacific island so isolated that a boat calls only once every three months. But communities everywhere demand Dunlop products and so even in this remote place there is a Dunlop distributor. This depot is one of many hundreds, small and large, covering the world. Recent years have seen such an expansion of Dunlop operations that today there are distributors in 140 countries, providing an increasing range of products and services. Wherever men build, mine, farm and travel, a Dunlop distributor is near at hand to supply their essential needs.

CPH/PRS/56

DUNLOP SYMBOL OF PROGRESS

Wheel' — has been published each year.

This 'project' series is designed to be used by eight to 12-year-olds. Children choose one of the booklets and use it as a basis for a 'thesis' on the subject with which it deals. Teachers often employ this method to help children to develop initiative and discrimination and to learn the art of research.

The numbers of requests increases yearly: in 1957 — the first complete year of the present series of booklets — 46,690 requests were received. In 1960 the number was 155,511.

Education is certainly becoming more educated — and a long, long way from the methods of Mr Squeer's whose approach you may remember, was essentially practical: 'Window: w-i-n-d-e-r. You boy, go and clean them'.

Cyril Bone has been appointed to the Board of Vinatex Ltd., a subsidiary of Reichhold Chemicals Ltd. He will continue to be the company's accountant and secretary

In the Swim

Reinforced plastics have taken a step forward in the boat building industry with the news that Lloyd's Register of Shipping has decided to issue provisional rules for the construction of GRP yachts.

A yacht with a reinforced plastics hull was first registered with Lloyds in 1956 and was annotated 'experimental' in the register. In 1958 the annotation was deleted as sufficient and satisfactory experience had been gained.

Lloyds now has sufficient experience (based on over 100 yachts) to formulate rules for this method of construction covering hulls from 20ft. to 120ft. in length. In view of possible developments in constructional techniques the rules will be designated provisional for the time being. They will be published on January 1 1962.

A. D. McDiarmid Retires

A. D. McDiarmid of the North British Rubber Co. is retiring this month after 42 years with the company. In 1919, after service with the Black Watch, he became one of the first post-war North British trainees and was subsequently moved to London as sales assistant to the London manager. His first executive appointment was in 1929 as London manager and a year later he became Northern sales manager. In 1946 he became assistant general sales manager and four years later general sales manager.

Since 1946 he has represented North British Rubber on the Rubber and Plastics Footwear Manufacturers' Association and for the past three years has been its chairman. He has also represented the company on the Council of the Federation of British Rubber and Allied Manufacturers.

He is succeded as chairman of the Footwear Association by another North British executive, J. P. Stephenson, general sales manager, General Products Division. It is interesting to record that, since its foundation in 1916, three of the four chairmen of the association have come from North British Rubber.

Dunlop Footwear were hosts to the Rubber and Plastics Footwear Manufacturers' Association at a luncheon held recently in London. On the same day J. P. Stephenson was elected chairman of the Association to replace A. D. McDiarmid who retires this month. Seen here are *(left to right)* **J. Frankenburg, A. D. McDiarmid, G. Bassett Smith, G. H. Ellis, C. H. M. Baker and J P. Stephenson** *(See: A. D. McDiarmid Retires)*

THE LEGAL ANGLE

Opinion or Fact?

By a Barrister

EVERY day of the week, every week of the year there are new developments in rubber and plastics — including new materials, new mutations or uses for old ones, and novel and useful properties for vital, new products. And as you consider marketing any one of these new lines, the same question recurs. How much can you say about them, without risking trouble?

After all, in order to sell your product, you must praise it, and when praising it, you may exaggerate.

'We have a magnificent new line in plastics toys', you may say, 'the material used is flexible, unbreakable, uncrackable, and will stand any amount of children's thumping. A real boon to any retailer'.

Suppose, now, that the material will break, if jumped upon by a hefty youngster. Will your customer be entitled to call off the whole deal? After all, the toys may be the very best on the market, particularly at the price — but can you be held to the literal truth of the praise you have lavished upon them?

The answer all depends upon whether your praise consisted of fact or opinion. You can be as opinionated as you like and be merely engaged in 'commercial puffing', but as soon as you mention a fact, it must be accurate.

Take the statement, for example, that the new product is 'the best on the market', or consider the view that the product is 'a boon to any retailer'. These are unproveable statements of opinion. On the other hand, when you say that the material is indestructible, will not break, crack or burn, those are clear expressions of fact, and a fact which is not a fact but which induces someone else to enter into a contract is known as a 'misrepresentation'.

If made innocently, in the honest belief of its truth, it will allow the deal to be called off and the purchaser to get his money back. If made fraudulently — either knowing it to be untrue or 'recklessly, careless whether it be true or false', then the purchaser can either renounce the entire deal or keep on with it and claim damages, to put him in the same financial position as he would have been, had the representation been true.

The moral, then? Praise by all means, but stick to opinion, as facts misstated can prove extremely dear.

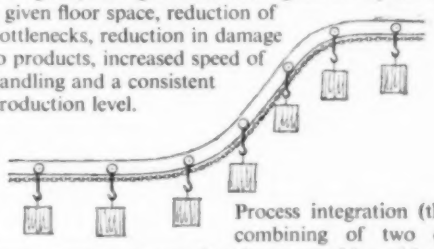
Electrical Aids in Industry—Data Sheet **21**

Materials Handling-1

Materials handling may well be defined as the technology covering the movement and storage of everything in and about industrial or commercial premises. The term covers the handling of raw materials as well as tools; the movement of components between operations and in stores, of finished products, and of the scrap, cutting oils and process machinery; and the movement of workpeople in relation to the handling of material.

The object of a materials-handling survey is to eliminate handling as far as possible and to study the remaining operations to ascertain if they can be economically and efficiently mechanised, i.e., if mechanical handling can be applied.

Improved materials handling raises productivity, for it gives, among other benefits: greater output from a given floor space, reduction of bottlenecks, reduction in damage to products, increased speed of handling and a consistent production level.



Process integration (the combining of two or more processes in one situation or machine with no manual inter-process handling, or the mechanical linking together of two or more processes for automatic operation) is one of the preliminary steps in the development of automation. A stage is achieved quite close to automation when the processing and handling are completely integrated, for then instrumentation and control can be readily applied.

MECHANICAL HANDLING

Many kinds of mechanical-handling equipment are in use today, each with its own attributes and uses, but in most cases there is only one type which offers the best solution to any one handling problem. Most mechanical-handling equipment is electrically operated, and the judicious use of electricity in this way can substantially increase productivity, reduce production costs and improve conditions for the worker, for the expenditure of very little power.

Main Categories of Mechanical Handling Equipment

LIFTING EQUIPMENT; OVERHEAD RUNWAYS; CRANES; CONVEYORS AND ELEVATORS; INDUSTRIAL TRUCKS.

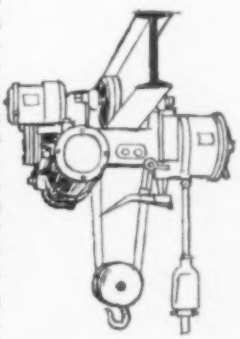
LIFTING EQUIPMENT

Electric pulley blocks are used for loading and unloading purposes, warehousing and in process work. When used with a trolley they have great flexibility. No manual effort is required, hence lifting does not cause any fatigue. They may use either chain or wire rope, and the speed of lift of both types is slower as the lifting capacity increases. An inching motor may be fitted to give a very slow speed for accurately positioning the load, for example in a jig.

Lifting magnets are used for the handling of iron and steel in conjunction with a crane or hoist. They do away with the necessity for slings and give increased speed of movement. They can lift castings, ingots and swarf, scrap, rolled steel sections, and can be used in loading bays, yards, machine shops, foundries and steelworks.

OVERHEAD RUNWAYS

Overhead runways have many uses where lifting and/or transport are required, when frequency of flow does not warrant a conveyor, e.g., for loading and unloading lorries, in core ovens, for feeding machines, for storage, for maintenance purposes, for textile drying and interconnecting two or more buildings. A runway consists of a steel girder along which a load trolley runs, and can incorporate switches, turntables, drop-sections and drop-arms and weigh-sections. Electrification of a runway takes all the manual effort out of the handling and movement, which can be completed more quickly. It consists of two main items: the electrified drive of the trolley (i.e., a power trolley) along the runway and an electrically operated lifting unit, usually an electric pulley block. A telpher has a cab for the operator suspended from trolleys on the runway and mechanically connected to the electrically driven trolley of the pulley blocks, thus travelling with them. Telphers are employed for handling individual loads which may be outside the range of normal electric blocks, e.g., when the highest speeds of travel or hoisting are required.



For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books are available on electricity and productivity (8/6 each, or 9/- post free)—'Materials Handling in Industry' is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity including one on materials handling. Ask for a catalogue.

7923

CUT HERE

PLASTICS MACHINERY DEVELOPMENTS

Peco Injection Moulders

ROTOTHRUST IN-LINE PRE-PLASTICIZATION

By JOHN SHEARING

THE name of the parent company, The Projectile and Engineering Co. Ltd., has almost been forgotten since the abbreviation 'Peco' has become so well known. Whichever name is used, however, the company has been manufacturing injection moulding machines during the past 15 years which is probably as long as anyone in the country. In this time, therefore, they have acquired a wealth of experience.

Their present range includes six presses having shot volumes from 2.75oz. up to 178oz. based on polystyrene as the injection moulding material. All of these are Rotothrust machines using in-line pre-plasticization. The units are thus of the most modern design.

The company has always been well in the forefront of machine developments and a brief study of their history indicates some of the general trends which have taken place in injection moulding machines. Only the well-known toggle clamping device has been retained more or less unchanged.

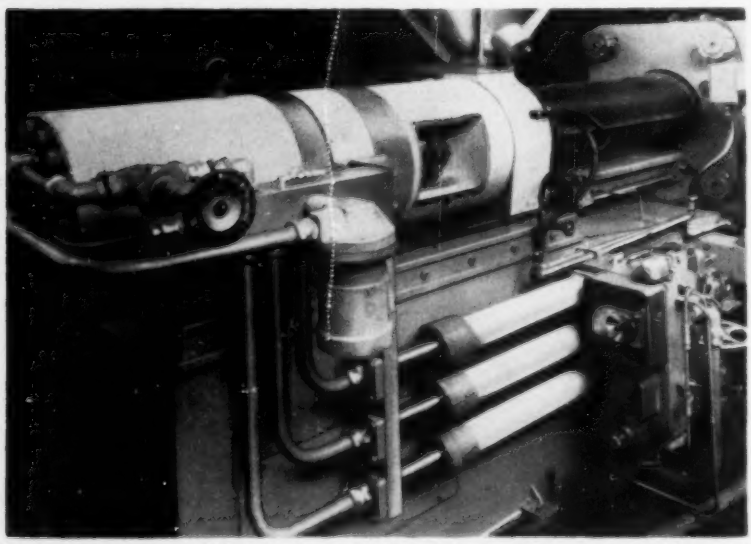
Initially, Peco machines were designed with single stage injection but suffered, like those of everyone else, from pressure losses and inadequate heating, with consequent troubles. About six years ago a two-stage injection process was developed called the Peco 'in-line' pre-plasticizer, where the material was preheated before any movement of the plunger took place. It was soon realized that even this method was unsuitable for certain materials, particularly rigid pvc, and further development work was undertaken. This resulted in the present well-known machines which can process all known materials. Full details of these are in the Table (page 997).

The Drive Unit

The injection unit fitted to the Peco machines utilizes the single screw preplasticizing system in which the screw is used for both plasticizing and for the injection process. One of the most outstanding features of this injection unit is the approach which has been made to the problem of driving the screw.

Many existing machines make use of a separate hydraulic or electric motor which transmits the drive to the screw via a worm or spur gear box. These drive features are normally fitted in addition to the hydraulic cylinder which is necessary to actuate the screw during the injection stage of the cycle.

However, in the Peco Rotothrust design, the requirements for both screw rotation and injection are combined into one compact unit. The feature may be generally described as one which has a special hydraulic ram used to provide rotating and reciprocating motions. This is the so-called Rotothrust unit.



The Peco Rotothrust drive unit — requirements for both screw rotation and injection are combined into one compact unit

The Screw

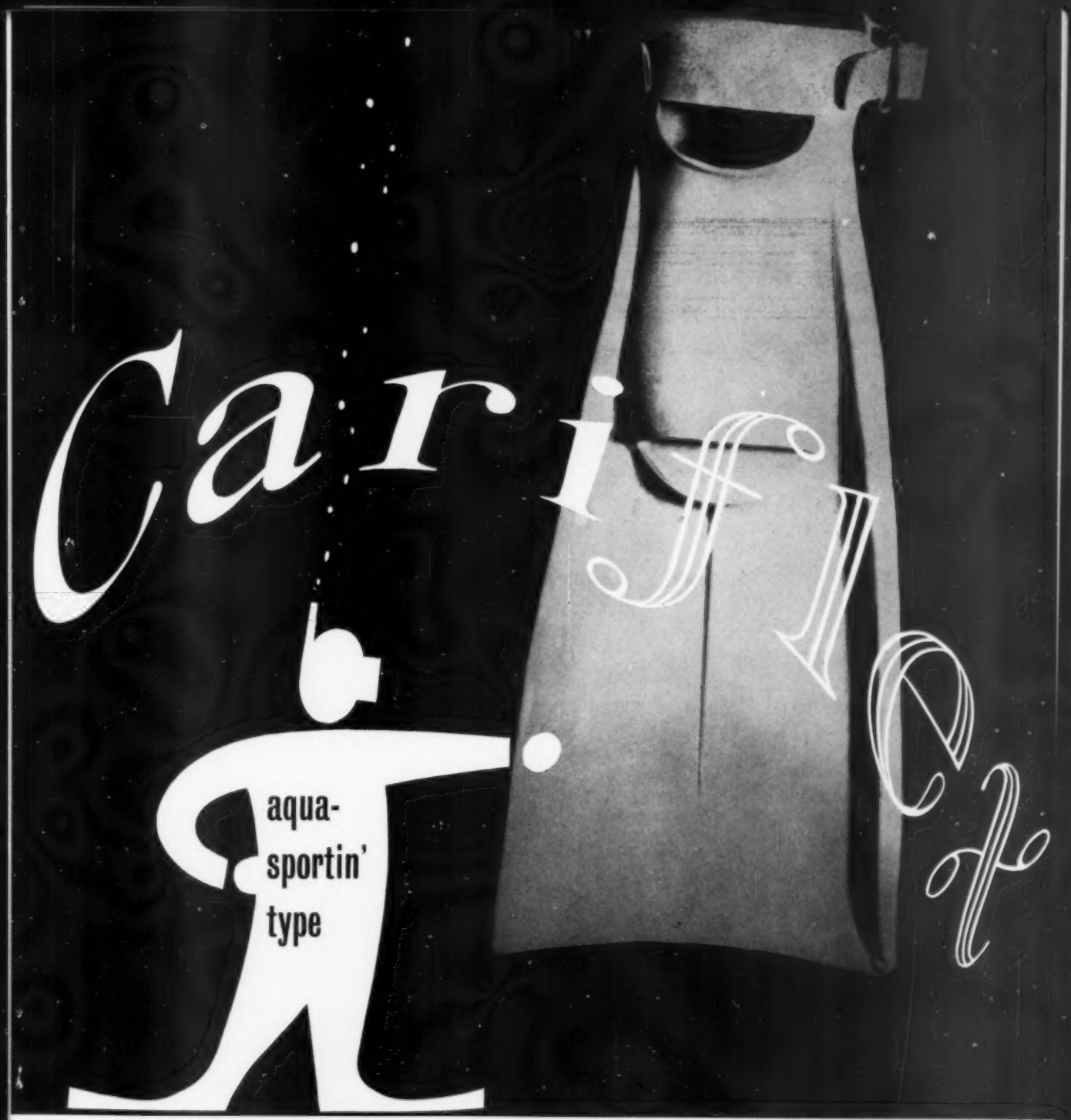
The screw speed is steplessly adjustable over a wide range of screw speeds. The required speed is achieved by controlling the volume of hydraulic fluid fed to the hydraulic motor delivery line. The screw speed may, therefore, be chosen without recourse to interchanging of gears or other procedures involving partial dismantling of the gear box.

The design of the screw and screw head is of particular interest and these have been tested with all commercially available thermoplastic materials. Each size of machine may be fitted with any of the three sizes of screws which are available to suit injection pressure shot capacity requirements. Both the screw and the head are suitable for use with all materials, including rigid pvc. This means that one size of the screw has a universal application and no change of screw or head is necessary for different materials.

The purpose of the screw head is to isolate the volume of material contained within the screw flights during the injection stage of the cycle. This means that the injection pressure is applied only to that material which is to be displaced into the mould. The screw head also incorporates a non-return valve feature which efficiently prevents leakage of material past the head during injection. This means that even with high injection pressures and materials of low viscosity, the injection pressure can be sustained after the mould has been filled as long as is necessary to prevent sink marks and voids. This provides a substantial advantage in obtaining dimensional consistency with critical mouldings. The universal application of this screw head also results in the maximum specified shot weights being obtained with all material, since no losses are incurred due to leakage over the head.

Both the screw and the head are manufactured from high quality alloy steel and provide good wear and corrosion resistance characteristics. The screw operates in an alloy liner

Continued on page 997



'Cariflex'-clad skin divers plumb the fishy depths—propelled by 'Carfflex' swim fins. The light colours of 'Cariflex' SBR types S1502, S1509, S1707 and SP103 are perfect for gaily coloured sports gear. These 'sportin' types' make a wide colour range possible, they're durable — resist ageing and discolouration — and they're easily moulded. 'Cariflex' Isoprene Rubber is also widely applied in sports goods, particularly in gum compounds or those using non-reinforcing fillers.
For swimming and water-ski equipment, inflatable boats, lifejackets and water wings, tenniquoits and beach balls, sports shoes and football studs—and many other applications—'Cariflex' is the right rubber for the job.

'CARIFLEX' SHELL-MADE RUBBER

For further information consult your Shell Company (in the U.K., apply to Shell Chemical Company Limited, Plastics & Rubbers Division, 170 Piccadilly, London, W.1.)

Shell Chemicals SHELL

IRI GOLF: LONDON SECTION'S ANNUAL DINNER

The London Section of the IRI Golfing Society held its annual dinner recently at Whitehall Court, London. Some of those present at this highly successful event *(left to right)*: **1. G. C. Swann (British Recovered Rubber), R. N. Ferguson (President IRIGS). 2. J. F. E. Ruffell (Durham Raw Materials), R. N. Perham and A. R. Reid (London Rubber), L. B. MacQueen (Cabot Carbon). 3. F. R. Andrews, B. J. Finnie (Chairman, London Section IRIGS). 4. J. O. Heyworth, H. P. Goodall (Expanded Rubber), R. McEwan (ISR) and V. Chappelle (P. B. Cow). 5. A. Smales (Philblack), E. E. Stedman (R. W. Greeff), L. V. Jennings (R. W. Greeff) and D. E. Bristow (R. W. Greeff). 6. J. Mulroy** *(RPW)* **and T. W. W. Davie (North British). 7. L. V. Jennings (R. W. Greeff), A. Whitehead (Whitehead Chemical), J. M. Gallie (R. and J. Dick), 8. J. E. Davis (Lewis Gilder), D. G. Newcomb (Veedip) and R. Bassett (BTR). 9. W. Smith (Wilfrid Smith) and B. Hughes. 10. Group captains, past and present: J. E. Pilbrow, W. Smith, W. A. Ingram, B. J. Finnie, H. R. Cuzner, J. F. E. Ruffell, D. Davies, L. B. MacQueen and E. H. V. Jorey. 11. W. J. Nave, C. N. Weller (Shell Chemical) and J. A. Minch (Shell Chemical). 12. G. C. Swann, P. Blewitt (Waltham Rubber) and J. Hudson (Lintafoam). 13. W. Stebbens, A. H. Padgham (hon. professional) and E. H. V. Jorey (Consolidated Zinc). 14. L. V. Jennings, H. R. Cuzner (Chemicovens). 15. C. D. L. Smith (Wilfrid Smith) and B. R. Cuzner (Wilfrid Smith). 16. T. W. W. Davie, A. Smales (Philblack), L. V. Jennings. 17. J. H. Carrington (Anchor), T. A. Beazley (late BTR).** *(A report on the annual meeting preceding the dinner appears opposite)*

IRI GOLF

London Section's Annual Dinner

SEVENTY-FIVE members and guests attended the annual dinner of the London section of the IRI Golfing Society, held early this month at Whitehall Court. B. J. Finnie was in the chair, and the principal guest was the president of the society, R. N. Ferguson.

Guests came from both Manchester and Scottish sections, and speeches were made by A. R. Reid, L. B. MacQueen, R. N. Ferguson and B. J. Finnie.

At the annual general meeting, which preceded the dinner, official appointments were made for 1962.

L. B. MacQueen was appointed captain, F. L. Davis vice-captain and B. R. Cuzner and C. D. L. Smith, joint honorary secretaries and treasurers.

It was reported that the following fixtures had been arranged for 1962:

March 31-April 1 — Spring Meeting, Royal Cinque Ports.

April 18 — Penfold Trophy, Sandy Lodge.

May 17 — Captain's Prize, Addington.

July 12 — Worthington Cup, Finchley.

September 20 — Sorbo Bowl, Wimbledon.

October 6/7 — Autumn Meeting, Hankley Common.

Pictures — opposite page

Whitby on Biogenesis

'The Biogenesis of Rubber: How the Tree Makes Rubber' is Prof. Stafford Whitby's subject for the 17th Foundation Lecture of the Institution of the Rubber Industry. It will be held at the Institution of Electrical Engineers on Monday, May 21 1962. The lecture will be followed by a dinner at the Savoy Hotel, London.

Prof. Whitby, one of the most famous figures in the rubber industry, in 1928 became the first holder of the Colwyn Gold Medal, the industry's highest honour for conspicuous scientific services.

He is professor of rubber chemistry and director of rubber research at the University of Akron, and was at one time director of the chemical research laboratory of the Department of Scientific and Industrial Research at Teddington, Middlesex. He was editor-in-chief of the first authorative book on synthetic rubber, prepared under the auspices of the American Chemical Society, and published in 1954.

Plastics Statistics

OCTOBER EXPORTS AND IMPORTS

PLASTICS materials exports showed an increase of about 4,000 tons over the figures for October 1961: 18,986 tons (£3,631,960) compared with 12,904 tons (£3,191,522) for October last year. These figures from the official Trade and Navigation accounts also show that the largest quantity was again exported to Hong Kong (2,581 tons), followed by Belgium (1,169), France (1,038) and Denmark (1,018).

Imports were 6,705 tons (£2,102,446) compared with 6,242 tons (£2,026,035) for the same month last year. Western Germany and USA were still the largest suppliers with 1,480 and 1,381 tons respectively.

During the first ten months of 1961 imports were 66,472 tons (£22,595,576); for the corresponding period last year they were 76,505 tons (£23,258,204). Exports were 164,728 tons (£35,293,991) compared with 141,825 tons (£35,767,001) in 1960.

Details of imports of plastics materials during October 1961:

	Tons	£
Acrylics	414	113,415
Alkyd solid and liquid resins, solutions, emulsions and dispersions	249	44,909
Cellulose plastics:		
Acetate butyrate	110	117,119
Photographic (including cinematograph) film base (except acetate butyrate)	179	232,434
All other	115	104,997
Polyamides	269	188,644
Polystyrene	322	72,158
Polyvinyl chloride:		
Polymers and copolymers	1,787	219,721
All other	719	242,000
All other	2,541	767,049
Total	6,705	2,102,446

Exports of plastics materials during October 1961:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	510	297,591
Alkyd solid and liquid resins, solutions, emulsions and dispersions	454	92,060
Aminoplastics:		
Solid and liquid resins, including solutions	699	82,291
Moulding and extrusion compounds	841	142,657
Cellulose plastics:		
Moulding and extrusion compounds	224	68,793
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	232	147,349
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	1,069	155,705
Other	721	208,747
Polystyrene	1,578	296,671
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	233	62,973
Polyvinyl chloride:		
Polymers and copolymers	1,249	157,790
Moulding and extrusion compounds	967	193,332
Sheet	642	266,805
Other	124	34,336
All other	8,265	1,319,095
Waste and scrap (including celluloid and film waste and scrap)	1,178	105,765
Total	18,986	3,631,960

UK exports to countries in the European Economic Community (Common Market) and the European Free Trade Association are shown below.

EXPORTS TO EEC

	Oct. 1960	Oct. 1961
Western Germany	356	379
Netherlands	592	685
Belgium	490	1,169
France	465	1,038
Italy	390	544
	2,293	3,815

Exports to Commonwealth countries during the month were 6,080 tons (3,615 in October 1960) and exports to all other foreign countries were 5,291 tons (4,136 tons).

EXPORTS TO EFTA

	Oct. 1960	Oct. 1961
Sweden	772	968
Norway	329	743
Denmark	650	1,018
Switzerland	570	459
Portugal	323	412
Austria	116	200
	2,760	3,800

(Any apparent discrepancies are due to rounding off of figures)

Rubber Proofing

OF ALL FABRICS FOR THE WATERPROOF GARMENT INDUSTRY

" AQUACHECK "
CUT TAPES & NON CONS
(biased and straight)

Interlinings for the Rainproof Trade.
Proofed Piece Goods.
Specialists in Proofing for Bags.

Proofing for Ground Sheets, Motor Hoods, Covers for Lorries and Stores, etc.

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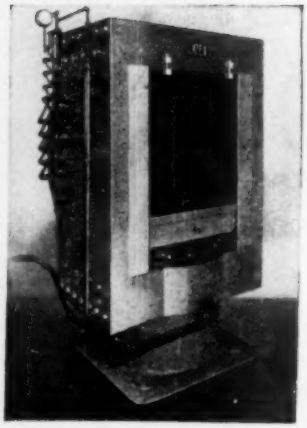
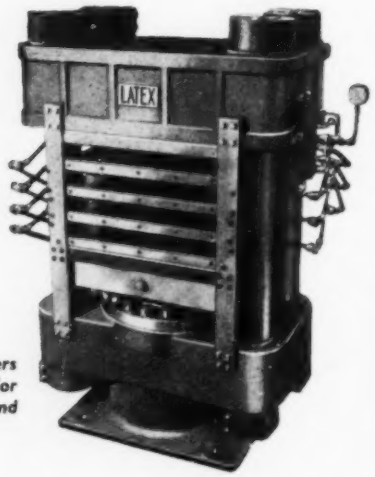
Latex Engineering Co





4-Column Press
1,000 tons

Also Makers of:
Internal Mixers, Calenders and all types of Machines for Mechanical Rubbers and Proofing of Fabrics

Slab Sided
Press
1,000 tons

VICTORIA STREET, DROYLSDEN, MANCHESTER

Telephone: Droylsden 1251 *Telegrams: Washer, Droylsden*

London Office:
4 CLEMENTS INN, LONDON, W.C.2
Telephone: CHAncery 2401-2 Telegrams: Plastrub, Estrand, London

RAPRA in the Regions

RUBBER AND PLASTICS ON COMMON GROUND

THE last of this year's series of regional meetings for members of the Rubber and Plastics Research Association took place in the Royal Institution in London, under the chairmanship of Dr A. P. Cumming, of John Bull Ltd.

Regional meetings have also been held recently in Glasgow, Manchester and Leicester, the chairmen being respectively, K. MacLellan (George MacLellan and Co. Ltd.), H. Jackson

J. W. Denson, who took the chair at the recent RAPRA regional meeting at Leicester

(Leyland and Birmingham Rubber Co. Ltd.), and J. W. Denson (Goodyear Tyre and Rubber Co.).

The principal object of these meetings is to enable members to discuss some of the research projects currently in hand at Shawbury with the senior staff engaged in the work: this is one of the ways in which contact is maintained between the headquarters of the Association and the members themselves and as such can be ranked with the technical symposia and liaison visits which are also organized for this purpose.

The discussions in the present series covered subjects of interest to both 'rubber' and 'plastics' members and were based on papers presented by Shawbury staff on adhesion to textiles (including microscopy of tyre cord), compounding developments (rubbers, polythene and pvc), SBR and natural rubber latex blends, and a review of RAPRA's work on dynamic properties.

Personal Contact

An advantage of the meetings was the value derived by the members attending from personal contact with the men working on the problems under review and from the interchange of ideas in what one of the chairmen described as 'the agreeable atmosphere of a family gathering'. This aspect is particularly important in enabling the representatives of plastics firms which have recently become members to compare notes with their counterparts in rubber companies which have been members for many years, not only on technical questions but also on the advantages of membership of the Association. In this way the healthy development of the organization is assured.

Abstracts

The following are abstracts of the papers discussed in this series of meetings:—

Compounding Developments

R. C. W. Moakes reported on evaluations on new polymers such as ethylene-propylene rubber, and trans-polybutadiene, which later might be important in future transmission belting applications. Work had also been done on filling plasticized pvc with calcium carbonate obtained from a number of different geographical sources. Little difference between the various types had been revealed. Polythene loading, too, was being examined. The effects of quicklime-oil dispersions to reduce porosity in rubber compounds were discussed in detail, with particular reference to their value in continuous vulcanization processes.

SBR/NR Latex blends

The economic advantages of such blends for foamed applications were considered by A. L. King particularly in view of competition from polyurethanes. It had, however, been discovered that two compounding ingredients generally used in latex foam compounding, zinc oxide and the zinc salt of MBT, had a destabilizing effect on the SBR latex. It had been suggested that the presence of polyvalent zinc ions brought about agglomeration of the latex particles, thus giving rise to malformations in the test pieces. The use of sequestering agents (EDTA) or elimination of zinc oxide and zinc MBT from the formula had been considered in efforts to solve the problem.

Adhesion to textiles

It was suggested in the paper by Dr W. C. Wake and D. I. James that a mechanical factor influenced the adhesion of rubber to tyre-cords made of continuous filament yarns. The penetration of the adhesive into the cord during dipping had been considered. The nature of adhesion failure had been examined using five different types of dynamic tests, and as a result it had been found that the most commonly occurring type of failure was characteristic for a given test and that none of the tests reproduced exactly the failure pattern to be found in a tyre.

Dynamic Properties of Rubber

The work carried out over the last three years on the dynamic properties of rubber was reviewed by A. R. Payne. The earlier work on the changes produced by temperature and frequency on elastic and viscous properties were briefly discussed as was the use of the Ferry Transform. The dynamic properties of filler loaded rubbers were discussed in greater detail, and it was shown how the elastic and viscous properties changed with the amplitude of straining and the concentration and type of filler. It was also shown how the hysteretic properties of carbon black loaded rubbers were almost entirely due to the structure breakdown of the carbon black rubber agglomeration. The effect of heat treatment of the unvulcanized stock and the attraction of the carbon black in reducing these structure effects was discussed in greater detail. The implications of these results on the current theories of reinforcement was then considered.

Handles, injection moulded from M. and B. Plastic's Technyl nylon, are fitted to this teapot and coffee pot—new additions to the Holloware range

Plantation Newsletter

MALAYA APPEALS ON STOCKPILE LIQUIDATION

FROM KUALA LUMPUR

MALAYA might find it necessary to put forward proposals for the institution of a system of international control over the liquidation of surpluses from stockpiles of primary commodities, the Minister of Commerce and Industry, Inche Mohamed Khir Johari, has just told a GATT conference in Geneva.

Making specific reference to the releases of stockpile rubber, the Minister said that from past experience Malaya found that it was not enough for her to be assured and promised sympathetic consideration and opportunities for consultation. He appealed to countries maintaining strategic stockpiles of raw materials to carry out their programme of liquidation in a manner which would not disrupt artificially the market.

Various principles and guidelines regarding such liquidation have been agreed to and adopted under the General Agreement, but Malaya feels that these will be mere lip-service if they are not observed in a manner consistent with and in the true spirit of these pledges.

The Malayan delegation attending the conference further appealed to major consuming countries to give their support to international commodity agreements. In the past, many have been hesitant in supporting these agreements.

As Malaya pointed out: 'After all, it is also in their interest as much as it is to the producing countries to have stability in the trade of these commodities'.

Meanwhile, a planter in Johore has suggested that further expansion of synthetic should be prevented by reversing the attack now. He said the price of rubber at 73 cents (Malaya) a lb. had caused some concern, but wages were still good generally, and he submitted that it would be for the ultimate benefit of the industry to undercut the synthetic market now by a margin of say two or three cents a lb., even if this necessitated selling in the 60 cents zone.

The planter agreed that such a move, perhaps, would not be popular but it would regain the lion's share of world markets and, equally important, ensure that in the years ahead when production would be increased and costs reduced by higher yielding material, a ready market would await Malaya's natural rubber.

He urged that this market could very easily be lost completely in the next few critical years, unless a determined effort was made to discourage further expansion of synthetic plants which would also progressively reduce their production costs.

'Those of us in the industry, tapper, planter and shareholder alike, should face the fact that prices are likely to and must remain low for the long-term benefit of all of us and a control imposed on the lines suggested would appear to be a practical solution. Sacrifices made now would be well rewarded in the not too distant future', he added.

Observers here point out that this

by our
Malayan Correspondent

idea is not new, but in one variation or another it is probably more widespread today now that the stereo-regulars have put the decisiveness of the price factor beyond question and for the first time for many years production of both natural and synthetic is in surplus.

It is generally agreed that natural, selling several cents below competitors, would stand an obvious chance of discouraging new investment in synthetic plant, but it is hardly likely that even cut-price natural would regain the lion's share of the market.

However, assuming that this idea is accepted — and this cannot be taken for granted — the large, well-organized estates can readily put up with the loss of a few cents. It has recently been estimated that with rubber at 70 cents, many companies can still pay dividends yielding from 15% to as high as 18%.

But this is far from true for all estates and certainly not for the industry as a whole.

The fact has to be faced that in all-out competition with synthetic, carried to the extent of price-cutting, most of the smallholders would be instant casualties. Recently, the Smallholders' Council said that yields averaged less than 400lb. per acre on smallholdings and the Council calculated that with rubber at 80 cents a lb., a man with four acres to his name earned only $56 (£66) a month.

The political implications of these figures are by themselves enough to make the Malayan Government step back in horror from any scheme that required deliberate action on its part to knock down the rubber price.

Kidnap Bid

A bid to kidnap a rubber estate manager was foiled when police were given a 'tip-off' and ambushed a gang just as they were about to enter their victim's bungalow. While the police trap was being sprung, Mr Wong Ching Boon, 49, managr of the Lee Rubber Estate at Senai, 12 miles from Johore Bahru, watched from his bungalow window. The police arrested two suspects and seized a shotgun from the gang as they reached the steps of the bungalow.

Mr Gan Teck Yeow, a rubber industry leader and rubber marketing and quality expert, has been appointed chairman of the Malayan Rubber Export Registration Board. Chairmanship has been vacant over one year due to difficulty of getting a man acceptable both to the Federation and Singapore.

Rubber Statistics

WORLD SITUATION TO AUGUST

THE following preliminary information on the world rubber situation is given by the Secretariat of the International Rubber Study Group (in long tons):

NATURAL RUBBER

	Aug.	Jan./Aug.
Production ..	202,500	1,365,000
Deliveries from stockpiles[1]	2,000	19,000
Consumption[2] ..	170,000	1,347,500
STOCKS END PERIOD		
In producing areas..	272,500	
In consuming areas	222,500	
Afloat	252,500	
	747,500	

[1]Deliveries from the government stockpiles of the US and the UK.

[2]Including estimated gross imports into the Soviet Union and China as follows: Soviet Union—August, 35,500; January/August, 220,250; China—August, 6,750; January/August, 40,750.

SYNTHETIC RUBBER

	Aug.	Jan./Aug.
Production ..	162,500	1,245,000
Consumption ..	157,500	1,212,500
STOCKS END PERIOD	372,500	

Reported exports of rubber from the Republic of Indonesia during August 1961 amounted to 69,282 long tons of which 23,068 long tons were reported as being of estate origin.

United States

The following statistics for the month of October 1961 have been issued by the United States Department of Commerce (in long tons):

NATURAL RUBBER

Consumption: 40,010 of which latex 3,957
Stocks: 62,378 of which latex 5,899

SYNTHETIC RUBBER

	Production	Consumption	Stocks
S-type ..	105,098	84,914	176,506
Butyl.. ..	8,303	5,757	29,745
Neoprene ..	10,917	7,770	16,457
N-type ..	3,891	3,644	7,455
Stereo-regular	5,577	2,948	12,251
Total.. ..	133,786	105,033	242,414

Total new rubber consumption during October amounted to 145,043 long tons.

PLASTICS MACHINERY DEVELOPMENTS

Continued from page 990

whose suitability for this type of application has long been accepted with extruders all over the world. This alloy liner also provides good corrosion and wear resistance. Thus, by careful selection of screw, barrel and liner materials, favourable conditions are established for long life under arduous conditions with different materials.

Nozzle Heating and Cooling

Quite a number of features have been incorporated into the machine to give it its exclusive nature. For example, two nozzles are supplied: the standard type used by most machines and an automatic shut-off nozzle, for use with low viscosity materials, particularly nylon and polythene.

The location of the nozzle with respect to the rear of the stationary platen is controlled by the hydraulic carriage cylinder mounted on top of the base at the injection end of the machine. Suitable controls are provided so that an automatic sprue-breaking movement can be obtained when desired. In addition, the complete injection carriage may be retracted for maintenance and setting purposes.

A number of resistance band heaters are provided along the barrel length to enable graded heating to be obtained. Independent control of the shut-off nozzle is also provided. A comprehensive water cooling system is incorporated and this is piped to the oil cooler, hopper plate and mould space. The control of water supplied to the mould can be set using the water control valve on the front of the machine. Visual indication of flow of cooling water is possible with the eye level water collecting and drainage box fitted behind the injection unit.

The shot weight of the machine may be steplessly adjusted from maximum to zero to suit specific moulds. This control is achieved by use of the volume control mechanism in an easily accessible position at the front of the injection unit. An aluminium hopper is fitted to the machine which incorporates a drain shaft at the rear for easy evacuation of material from the hopper when required. Below the hopper is mounted a special hopper base plate suitably vented to permit the escape of any volatiles from the feed end of the screw.

Other Features

The locking unit conforms with the general well-tried design which has been incorporated on various sizes of toggle operated machines manufactured by Peco for several years. The locking force is developed through the fully balanced double toggle system which ensures efficient distribution of the locking force over the whole platen area.

To cater for dies of different thicknesses, a large diameter central screw adjustment system is provided. This is disposed between the front toggle plate and the moving platen, thus enabling the moving platen to be easily adjusted to suit different moulds.

The operating controls necessary for use with the locking unit, such as the mould speed control and mould safety device, are located on the front of the machine below the toggle space. Similarly, the injection pressure and screw back pressure control valves and pressure gauges are located at the front of the machine at the injection end. The injection speed and screw speed controls are also at the inspection end.

Electrical controls are fitted in a free-standing electrical control cabinet which can be placed in any convenient position. It houses the temperature control instruments, timing controls, selector switches and the like. The variation of the machine is controlled by an operator by means of a push button control unit attached to the front of the machine in an accessible position.

PECO INJECTION MOULDING MACHINES

Model No.:	21 MR.	30 MR.			35 MR.	40 MR.	50 MR.	60 MR
		A*	B	C				
Shot wt., oz. (polystyrene)	2¼	9	13½	18	9–18†	18–30	36–60	86–178
Approx. plasticising capacity, lb./hr.	50		100		100	200	200	400
Rpm of screw	15–200		15–100		15–100	15–90	15–90	15–75
Screw diameter, in.	1¾	2½	3	3½	2½–3½	3½–4½	3½–4½	4½–6½
Max. injection pressure, psi	16,200	1,800	12,500	9,000	18,000–9,100	15,100–9,100	15,100–9,100	17,000–7,500
Full injection stroke, in.	2½		3½		3½	3½	7	10
Rate, in.³/sec.	6.5	8.5	12.4	16	17–32	20–33	26.7–43	40–80
Approx. projected moulding area, in.²	32	60	88	110	86–172	130–210	250–350	400–780
Size of platens, h x v in.	18 x 18	25 x 23½			27 x 28½	30 x 32	36 x 42	54 x 56
Mould opening stroke, in.	10	7½–12			13½–8	12½–17½	16–23	21–32
Mould locking force, tons	80	150			275	300	500	750

* A, B and C are different screws. † Depending on size of screw.

BOOK REVIEW

Resin Casting

ELECTRONIC PACKAGING WITH RESINS, by Charles A. Harper, published by the McGraw-Hill Book Co., 339 pp., price 85s.

This book was written primarily to provide a better understanding of embedment — packaging materials and techniques for people engaged in the electronics industry who have little or no chemical training. The author has undoubtedly achieved his object although the title of this book does not, to a British reader, accurately describe the contents. Perhaps in the USA the word 'packaging' is used extensively in the electronics industry, but in the UK this word is related to an entirely different branch of industry. A more exact and correct title for this excellent book is probably 'Casting Processes and Materials for the Electronics Industry'.

On reading this book and analysing the chapter arrangements it can be seen that a systematic approach has been used. The first group of chapters deal with base resins and many other materials of the widest applications. Then come chapters on resin modification and equipment necessary for 'embedded - package' manufacturing. This is followed by a discussion of manufacturing control for the various processes.

The author has adequately discussed some of the recent developments in base resins including the new epoxy systems of novolaks, cyclo aliphatic diepoxides and epoxidized polyolefins. The uses of various polymeric foams, low-density systems, flame retardant and high temperature resins are all fully described. The materials discussed include unsaturated polyesters, epoxies, polyurethanes, silicones and many other polymeric substances. Sufficient coverage has also been allocated to important resin modifiers such as fillers and diluents.

A small error is to be found on page 37 where the polysulphides are included as curing agents for epoxy resins. This is not strictly correct as these materials are not practical curing agents for the epoxies and must be used in conjunction with an aliphatic or aromatic amine.

This book is recommended not only as a good source of reference material but as a practical guide to those concerned with this highly skilled branch of industry. — D. C. M.

Soviet Plastics

The latest issue of *Soviet Plastics* (designated 11) — a cover-to-cover translation of the monthly Russian journal *Plasticheskie Massey* — has now been published.

Articles include topics on the ageing of polythene, epoxy adhesives containing dicyandiamide as a hardener, the stabilization of pvc, plastics roofing materials and the strength of plastics under repeated loads.

Soviet Plastics is produced, with the support of DSIR, by the Rubber and Plastics Research Association, in connexion with Rubber and Technical Press Ltd., Gaywood House, Great Peter Street, London, S.W.1.

Rubber Markets

LONDON

During a generally uneventful four-day trading period ending noon December 12, United Kingdom rubber prices lost about ¼d. per lb. The market commenced slightly steadier, but lack of follow through, coupled with some attempted profit-taking, soon erased the advance. Thereafter, in accordance with lower-priced origin advices, April/June landed sellers were inclined to offer more cheaply and consequently business was soon effected in that position at the reduced level, thereby causing a generally softer undertone to spread throughout the remainder of the list. This movement was subsequently followed by fairly keen selling interests of December and January No. 1 RSS, but when the offerings were absorbed, a minor improvement set in on a mild Continental enquiry (from Hamburg) for No. 1, No. 2 and No. 3 sheets which in the main found sellers reserved. Latterly the trade was said to have entered into the seasonal lull which is usually associated with the pre-Christmas period.

Latest prices are as follows:

No. 1 RSS Spot: 23d.-23¼d.

Settlement House:

January 23⅛d.-23⅜d.
February 23⅛d.-23⅜d.
March 23⅜d.-23½d.
January/March 23⅛d.-23⅜d.
April/June 23⅛d.-23⅜d.
July/September 23⅛d.-23⅜d.
October/December 23⅜d.-23⅝d.

No. 1 RSS cif basis ports:

December 22⅝d.-22¾d.
January 22⅝d.-23d.

Godown:

December 75⅛ buyers (Straits cents).

LATEX

Centrifuged 60% latex per gallon in drums, seller, January, 13s. 5d., cif European ports. Spot, seller, 13s. 11d. Bulk, seller, d.w. 13s. 5d. Normal, seller, January, 10s. 5d.

AMSTERDAM

The Amsterdam rubber market ruled as under on December 11:

	Guilders per kilo	
No. 1 RMA	Dec. 11	Previous
December ..	2.17	2.17
January	2.17	2.17
February ..	2.17	2.17
March	2.17	2.17
January/March ..	2.17	2.17
April	2.20	2.20

Sales: Nil. Tendency: Quiet.

BANGKOK

The price of Spot No. 1 RSS at Bangkok on December 9 was 25.25 (25.25) US cents per lb.

NEW YORK

The New York rubber market ruled as under on December 11:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Dec. 11	Previous
No. 1 RSS, Dec.	27⅛b–27⅜a	27⅛b–27⅜a
Jan.	27⅛b–27⅜a	27⅛b–27⅛a
No. 2 RSS, Dec.	27⅛b–27⅛a	27⅜n
Jan.	27⅛b–27⅛a	27⅛b–27⅜a
No. 3 RSS, Dec.	27b –27⅛a	27⅛n
Jan.	27b –27⅛a	27b –27⅛a
No. 1 RSS, Spot	27⅜n	27⅜n
No. 3 amber blanket crepe, Dec.	26⅛n	26⅛n

FUTURES—REX CONTRACT

	Dec. 11	Prev. Close
Jan. ..	27.75b–27.90a	27.75b–27.90a

Sales: 3. Tendency: Steady

Futures were steady on December 11 in meagre dealings. Traders said physical rubber was steady. Offerings from the Far East were scarce in ribbed sheets, ambers and browns.

SINGAPORE

Very quiet conditions continued to prevail on December 11. There was little incentive to trade. Lower sheet was in small demand and purchases were confined largely to covering previous orders. Idle conditions continued in the afternoon and prices tended to steady slightly, but little trading was in evidence and few exchanges were reported. Lower sheets were neglected.

	Malayan cents per lb., fob Malayan ports to open ports	
	Dec. 11	Prev. Close
No. 1 RSS, Dec. ..	76⅛–76⅜	75⅜–76
No. 1 RSS, Jan. ..	77 –77⅛	76⅝–76⅞
No. 2 RSS, Dec. ..	74⅛–75⅛	74⅜–75⅛
No. 3 RSS, Dec. ..	73⅜–74⅛	73⅜–74⅛
No. 4 RSS, Dec. ..	73⅛–74	73⅛–74
No. 5 RSS, Dec. ..	71 –72	71⅛–72⅛
No. 1 RSS, prompt..	76– 76⅜	75⅛–76
No. 3 blanket thick remilled crepe, Dec.	74 –75	73⅜–74⅜
No. 1 fine pale crepe, Dec.	84⅛–85⅛	84⅜–85⅜
2x Thin brown crepe (estate), Dec. ..	72 –73	71⅛–72⅛

Tendency: Quiet.

DJAKARTA

	Rupiahs per kilo	
	Dec. 11	Previous
Spot No. 1 Priok ..	43.00b	43.00b
Spot No. 2 Priok ..	42.00b	42.00b
Spot No. 3 Priok ..	41.00b	41.00b
Spot No. 1 fine pale crepe	39.00b	38.50n

Tendency: Steady.

CEYLON

The price of Spot No. 1 RSS at Colombo on December 11 was 95⅛ Ceylon cents per lb.

BICC Cables in USSR Factory

Courtaulds Ltd. has recently completed deliveries against a contract for the supply of a complete factory in the USSR for the manufacture of tyre cord. The plant was designed at the engineering headquarters of the company.

Automatic centralized control of plant units is employed in this new tyre cord factory and this method required electrical connexions utilizing both telecommunication and mineral insulated copper sheathed cables with pvc oversheath, and thermocouples. These were designed, manufactured and supplied by British Insulated Callender's Cables Ltd.

MICS cable having Arctic grade pvc sheathing was chosen for individual runs where plant connecting points in the factory are widely distributed and for thermocouple connexions.

Interface E.61

Early in November Columbian International (Great Britain) Ltd. introduced Interface E.61, a new mould lubricant based upon a polythene water emulsion. The firm says that response to this material has been 'quite staggering . . . never have such a large number of sample requests followed immediately upon an introduction of this kind'.

A new series of standard packs has now been established for Interface E.61 ranging from 5lb. polythene bottles (6s. a lb. delivered) to 100lb. lacquered steel drums (4s. 6d. a lb. delivered).

Polly Ester Says...

'Microcellular — sure, and it must be a prison for the little folk'

Industry INTELLIGENCE

Technical Data

Weekly Formulations

A new price card being mailed to manufacturers weekly by the International Synthetic Rubber Co. Ltd., Hythe, Southampton, contains a new formulation every week.

One of the latest is a mix for gas tubing, given below:

GAS TUBING FORMULATION

Intol 1502	75
Intol 1778	25
Winnofil S	50
Puraflo V8	125
Paraffin wax	2
Coumarone resin	5
Zinc oxide	5
Stearic acid	1
Nonox WSL	1
Cyclohexyl benzthiazyl sulphenamide	1.75
Di ortho tolyl guanidine	0.5
Sulphur	1.75
Compound cost pence lb.	9.7
Density, gm./cc.	1.5
Optimum cure, 1/10" mins. 292°F.	30
Compound Mooney ML_4 100°C.	60
IRHD	65
Tensile strength	1,400
Elongation at break, %	700

Notes

1. The above compound may be coloured black with 5phr of FEF carbon black or coloured with titanium dioxide and a pigment.
2. This compound may also be vulcanized with 10phr of antimony sulphide in place of sulphur.
3. Compound cost is based on the ex works price at 3-ton level of the individual ingredients used in the investigation.

Reinforcing Fillers

A provisional data sheet detailing the uses of Calofort S as a reinforcing filler for SBR has been published by John and E. Sturge Ltd., Wheeleys Road, Birmingham 15. It is claimed that Calofort S, a stearate-coated ultrafine pcc, is one of the cheapest reinforcing white fillers available and is particularly useful in SBR compounds where carbon black cannot be used, because of colour considerations, and where all-black loadings tend to yield certain undesirable physical properties.

The data sheet reports that loadings of Calofort S of up to 200 phr have been achieved, without affecting the tensile strength of the finished SBR compound or the high level of ultimate extension.

Tables illustrate the physical characteristics of SBR compounds using Calofort S on its own or blended with carbon blacks.

A second data sheet covers the use of Calofort S in nitrile rubber, and a table shows its reinforcing properties in three standard compounds.

Tretol Epiflor

Tretol Epiflor — the trowel applied, oil and acid resistant floor topping — is now available in two grades. The manufacturer — Tretol Ltd., The Hyde, London, N.W.9 — has developed a special heavy duty grade which is designed particularly for use where the flooring must withstand extremely hard wear from trucking. The new grade also has good resistance to oils and acids, and is completely non-slip.

The standard colour range of Tretol Epiflor has now been widened to include a dark grey shade, which tones in with normal concrete and granolithic floors.

Full technical data can be obtained from the manufacturers at the address given above.

Publications

Bakelite Gears

A new edition of a publication 'Bakelite Laminated for Gears', which is of special interest to designers and engineers, is now available from Bakelite Ltd., 12-18 Grosvenor Gardens, London, S.W.1.

Over a period of years Bakelite Laminated has proved to be a useful material for non-metallic gears. The material is not only strong and stable but possesses an elasticity sufficient to absorb shocks and intermittent stresses which, on occasions, would cause the failure of metal gears or gears constructed of other non-metallic substances.

In addition, the gears are resistant to most acids and mild alkalies and will operate satisfactorily in the presence of oil, water or steam.

The booklet descibes the physical and mechanical properties of the material, the applications to which it is suited, installation principles, and gives all relevant formula and data.

Resin/Fibre Spray

The facilities and engineering services offered by Hupp Systems Inc., PO Box 3290, Sarasota, Florida, are being expanded, and new equipment will be introduced for handling a wide range of resins and fibres.

A series of information leaflets has been issued by the company giving details of the machinery produced for the fabrication of reinforced plastics components by the resin/fibre spray deposit method and describing the services offered to customers. These include taking a product problem through from drawing board stage to a semi-automated production line, and training technicians in the use of resin/fibre spray depositing equipment.

Polyurethane Foams

A booklet recently issued by Imperial Chemical Industries Ltd., Dyestuffs Division, is entitled 'Flexible and Rigid Polyurethane Foams — Their Properties, Applications and Specifications for the Automotive Industry'. This is a report based on a paper presented by J. M. Buist and A. Lowe at the ordinary general meetings of the Institution of Body Engineers in London, Oxford, Coventry and Glasgow, during the early part of the year.

The booklet is reprinted by permission from the *Institute Bulletin*, the journal of the Institute of British Carriage and Automobile Manufacturers and the National Federation of Vehicle Trades.

Polyurethane Die Blocks

An article reprinted from *Metalworking Production*, July 19 1961, has recently been made available by Imperial Chemical Industries Ltd., Dyestuffs Division. This is entitled 'Polyurethane Competes with Steel for Dies', and describes the advantages of using high durometer hardness (up to 95) polyurethane rubber for the production of forming dies. Using polyurethane, machining and grinding are virtually eliminated, design effort is minimized, replacement inserts can easily and cheaply be made up and tried out without losing the original form, the work is not scratched and so final polishing is eliminated and often the number of operations can be reduced.

Machines, Materials and Equipment

Speedex Saw

The Speedex automatic travelling circular saw, model C/3, is made by Speedix (Engineering) Ltd., North Lane, Leeds 6.

This robust machine is capable of cutting to length, automatically and accurately, all types of tubing and sections.

Operation is fully automatic and is activated by a photo-electric switch. A moving carriage and saw travel at extrusion speed, making it possible to cut the tube while moving. An electric interlock ensures that the saw blade only rotates when making a cut, and several safety features are incorporated.

The machine is also fitted with overriding manual controls for setting purposes. These enable the operator, even when the machine is working on a fully automatic cycle, to cut any length at any time and then revert at once to automatic operation.

Material Prices

Prices of materials appear regularly in RUBBER AND PLASTICS WEEKLY each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha	5s. 8d.—6s. 4d.
Ancap cp	2s. 10d.—3s. 8d.
Ancap Zinc Salt cp	3s. 2d.—4s. 2d.
Ancatax cp	3s. 9d.—4s. 6d.
Ancazate BU cp	6s. 3d.—6s. 9d.
Ancazate ET cp	5s.—6s. 4d.
Ancazate ME cp	6s. 2d.—7s.
Ancazate Q cp	6s. 1d.—6s. 4d.
Ancazate XX cp	5s. 1d.—5s. 9d.
Ancazide ET cp	5s. 9d.—6s. 6d.
Ancazide IS cp	7s. 6d.—8s. 6d.
Ancazide ME cp	4s. 6d.—5s.
Cu.D.D.	9s. 3d.—10s.
D.Bu.D	10s. 6s.—11s. 3d.
D.D.D.	12s. 2d.—13s. 3d.
D.P.G. cp	3s. 5d.—4s. 2d.
D.O.T.G. cp	4s. 5½d.—4s. 9d.
Dibenzo GMF	27s.—28s. 6d.
Furbac cp	5s.—5s. 9d.
Gamma	10s. 6d.—11s. 3d.
GMF	27s.—28s. 6d.
L.M.D.	9s. 3d.—10s.
M.Z.I.	3s. 6d.—4s. 2d.
N.Bu.D	10s. 6d.—11s. 3d.
Ni.P.D.	12s. 2d.—13s. 3d.
P.P.D.	12s. 2d.—13s. 3d.
P.T.D.	12s. 2d.—13s. 3d.
Robac 22	10s.—11s. 3d.
Robac 44	9s. 1d.—9s. 10d.
S.P.D	9s. 3d.—10s.
Suparac M	9s. 7d.
T.B.U.T.	15s.—16s.
T.E.T.	6s. 6d.—7s. 4d.
Thiuram P.25	15s.—16s.
T.M.S.	7s. 8d.—8s. 6d.
T.M.T.	5s. 4d.—6s. 3d.
Vulcacit CZ deldp	7s. 1d.
Vulcacit F deldp	4s. 8½d.
Vulcacit NP deldp	11s. 2d.
Vulcacit P Extra N deldp	8s. 1d.
Z.B.E.D.	15s.—16s.
Z.Bu.D	6s. 3d.—7s. 3d.
Z.D.C.	5s. 1d.—5s. 7d.
Z.L.	9s. 3d.—10s.
Z.P.D	9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite AK cp	3s. 6½d.—4s. 5½d.
Agerite HPX cp	4s. 5d.—4s. 10d.
Agerite Powder cp	3s. 7d.—4s.
Agerite White cp	8s. 10d.—9s. 7d.
Antioxidant 2246 cp	11s. 8d.—12s. 4d.
Antioxidant 425 cp	18s. 6d.—19s. 3d.
Antioxidant SP cp	3s. 8d.—5s.
BLE-25	3s. 7d.—4s. 5d.
BXA	3s. 6½d.—4s. 5½d.
Naugawhite	4s. 9d.—5s. 6d.
Octamine	3s. 9d.—4s. 6d.
Polygard	3s. 7½d.—4s. 5d.
UOP 88 xs	9s. 3d.
UOP 288 xs	9s. 3d.
Wing-Stay S	3s. 8d.—4s.
Wing-Stay T	4s. 10d.—5s. 6d.
Wing-Stay 100	10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag	£10—£40
Calcium Silicate del	9d.—10½d.
Calcene ptxw	£52—£69 10s.
Calcined Clay (Burgess) ptxs	£37—£53
Carbonate, Light Mg. ptsp	£97
Carbonate, Actidated Ca. pt	£28—£30
Carbon Blacks:	
Conductex SCF	1s. 2½d.
Continental AMPC ag	11¾d.—1s. 4½d.
Continex FEF ag	9¾d.—10½d.
Continex HAF ag	10¾d.—11d.
Continex HMF ag	9¼d.—9½d.
Continex ISAF ag	1s. 0¼d.—1s. 0½d.
Continex SRF, SRF-NS ag	8¾d.—9d.
Dixie 45 GPF xs	6¾d.—7¾d.
Dixie 60 HAF xs	7¾d.—8¾d.
Dixie 70 ISAF xs	9¼d.—10¼d.
Dixiedensed HM MPC xs	11¾d.
Dixiedensed 77 EPC xs	11¾d.
Furnex SRF	9d.
Kosmos 45 GPF	6¾d.—7¾d.
Kosmos 60 HAF	7¾d.—8¾d.
Kosmos 70 ISAF	9¼d.—10¼d.
Magecol 888 cp	7.60d.
Micronex MPC	11¾d.
Micronex W6 EPC	11¾d.
Philblack A. FEF	7d.—8d.
Philblack E. SAF	1s. 0¾d.—1s. 1d.
Philblack G. GPF	6¾d.—7¾d.
Philblack I. ISAF	9¼d.—10½d.
Philblack O HAF	7¾d.—8¾d.
Statex B. FF	10½d.
Statex R. HAF	11d.
Statex 93 HMF	9½d.
Sterling SO FEF	7d.—7½d.
Sterling V. GPF	6¾d.—7d.
Ukarb 327 GPF xs	6¾d.—7¾d.
Ukarb 340 xs	7¾d.—8¾d.
Vulcan 6 ISAF	9¾d.—10d.
Vulcan C CF	11d.—11¼d.
Vulcan 3 HAF	7¾d.—8d.
Vulcan XXX SCF	1s. 2¼d.—1s. 2¾d.
China Clay ptagxs	£12—£68 10s.
Factice Dark cp	1s. 0¼d.—1s. 10d.
Factice Whitbro cp	1s. 3¼d.—2s. 2¼d.
Factice White	1s. 5¼d.—1s. 11d.
Kieselguhr Spanish White ptxs	£37 12s. 6d.
Lithopone 30% ptxs	£68 10s.
Manosil VN3 pt	£109—£139
Manosil AS7	£84 10s.—£114 10s.
Micafine Powdered Mica ptxs	£67 10s.
Ochre Yellow pcxs	£1 19s.
Oxide Light Mg ptsp	£245
Oxide Red pcxs	£4 3s.
Oxide Titanium 98% pcxs	£8 8s
Rutiox CR pcxs	£9 3s
Rubber Gen. Gran. Mineral ptxs	£35 5s.
Shellac Dewaxed xs	2s.—3s. 9d.
Shellac Orange xs	1s. 9d.—2s. 3d.
Silica Hydrated ptxs	£113
Sulphur Manox Insoluble del	1s. 9d.
Sulphur Powdered ptdel	£20 17s.
Sulphur Sublimed Flowers ptxs	£52 10s.
Talc Norwegian ptxs	£13 7s. 6d.
Talc Italian ptxs	£30 2s. 6d.
Tufknit Durham CS	8¼d.—10¼d.
White Lead Dry ptdelsp	£108 5s.
Whitetex 2 Clay ptxs	£45 10s.
Whiting ptxs	£5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel	£6

Plasticizers and Softeners

Abalyn pc	220s.—271s.
Al Stearate ptxwdp	£253 10s.
Bisoflex 102 pt	£513—£568
Butyl Ricinoleate	2s. 6d.—2s. 6¾d.
But. Ac Ricinoleate	3s. 0¼d.—3s. 1¼d.
Butyl Stearate pt	£277—£282
Ca. Stearate ptcp	£220
Diallyl Phthalate	3s. 11d.—4s. 11¼d.
Dialkyl Phthalate pt	£221—£222
Dibutyl Phthalate pt	£203—£204
Dibutyl Sebacate	5s. 9½d.
DiOA pt	£354—£357
DiOS sp	5s. 0½d.—5s. 2d.
DOA pt	£414—£420
DOP pt	£276—£277
DOS sp	5s. 7½d.—5s. 9d.
Diisobutyl Phthalate pt	£196—£197
Diisooctyl Phthalate pt	£221—£222
Dinonyl Phthalate pt	£211—£212
DNS sp	5s. 2¾d.—5s. 4½d.
Ester Gum pcag	130s.—150s.
Flexol 3GO	4s. 8d.
Hercolyn pc	242s.—294s.
Lankroflex ED3	3s. 2d.—3s. 2¾d.
Lankroflex 29 pt	£216—£217
Lead Stearate ptxwdp	£223 10s.
Methyl Ricinoleate	2s. 4d.—2s. 4¾d.
Me. Ac Ricinoleate	2s. 11¾d.—3s. 0½d.
Polyglycol Oleate 400 pt	£285
Reomol D79A pt	£354—£357
Reomol D79S sp	5s. 0½d.—5s. 2d.
Reoplex 100 sp	6s. 1½d.—6s. 2¾d.
Reoplex 110 sp	5s. 10d.—6s. 5½d.
Reoplex 220 sp	5s. 6½d.—5s. 8d.
Reoplex 300 sp	7s. 2d.—7s. 3½d.
Reoplex 400 sp	4s. 2½d.—4s. 4d.
Rosin Oil pgag	8s.—18s.
Triphenyl Phosphate pt	£359
Tricresyl Phosphate pt	£233
Trixylyl Phosphate pt	£200
Zinc Stearate ptdel	£220—£230

Solvents and General Chemicals

Acetic acid ptdel	£77—£100
Acetic Anhydride ptdel	£128
Acetone ptdel	£75—£120
Alcohol:	
Absolute 74.5 op pgdel	4s. 0½d.—4s. 4½d.
Butyl pt	£132—£193 10s.
sec-Butyl ptdel	£128—£168
Ter-Butyl ptdel	£172—£195
Isopropyl Tech. 99% pgdel	5s.—6s. 5½d.
Butyl 'Carbitol' pt	£283
Butyl Acetate pt	£159—£217
Caprylic Acid ptdel	£395
Carbon Bisulphide ptxs	£71 10s.
Carbon Tetrachloride pg	12s. 4d.—20s.
'Cellosolve' Acetate pt	£250
Cresol m- 98% del	4s. 9d.
Cresol o- 30/31°C. del	1s.
Cresol p- 34/35°C. del	5s.
Ethyl Acetate pt	£131—£189
Formaldehyde ptdel	£40
Glycol:	
Diethylene pt	£158
Ethylene pt	£132
Polyethylene 200 pt	£214
,, 300 pt	£214
,, 400 pt	£214
,, 1,500 pt	£264
,, 4,000 pt	£274
,, 6,000 pt	£294
Isopropyl Acetate pt	£126—£184
Isobutyl Acetate 80% pt	£126—£185
Lauric Acid ptdel	£273
M.E.K. ptdel	£134 10s.—£143 10s.
M.I.B.K. ptdel	£166—£209
Methylated Spirits pgdel:	
Industrial 61op	5s. 5½d.—7s. 2d.
,, 74 op	6s. 3d.—7s. 11½d.
'Q' grade 68 op	8s. 5½d.—10s. 5d.
Pyridinised 66 op	5s. 10d.—7s. 6½d.
Denatured Methanol	3s. 9½d.—4s. 10d.
Monoethanolamine pt	£252
Naphtha Coal tar pg:	
Heavy 90—190	4s.
Light 90—160	5s. 1d.
Palmitic Acid ptdel	£147
Phenol pldel	1s. 4d.—1s. 7d.
Pyridine pg	16s. 6d.
Stearine ptag	£108—£130
Toluol Pure/Nitration pg	5s. 8d.
Toluol 90's pg	5s.
Triethanolamine pt	£224
Xylol 2/30 pg	5s. 9d.

British Standards

Woven Glass Fibre Fabrics (BS 3396:1961)

The British Standards Institution has published three parts of a new standard dealing with woven glass fibre fabrics for plastics reinforcement.

Part one covers loom — state fabrics and part two deals with fabrics which have been subjected to a desizing treatment. The standard is intended to cover glass fibre fabrics woven from continuous filament yarns and, generally after further treatment, used for the reinforcement of rigid plastics mouldings and laminates with various resin systems such as polyesters, epoxides, phenolics, silicones and melamines.

A variety of constructions of fabrics is dealt with and the requirements for the strength in both the warp and weft directions, together with maximum residual size content for the desized material are given.

Part three of the standard, covers finished fabrics for use with polyester resins, and it is hoped that further parts covering finished fabrics for use with other resins will follow.

Methods of Testing Synthetic Rubber Latices

Methods of sampling and testing synthetic latices do not, in all cases, agree with methods used to examine natural rubber latices. Because of this, the British Standards Institution has just issued BS 3397 which deals with synthetic rubber.

At the present moment the standard covers only methods of sampling and determining total solids, coagulum, pH and surface tension. However, work is continuing in the preparation of other standard methods, and these will be issued as addenda to the present document as and when they become available.

Copies of these Standards may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1.

Increases of Capital

Stalybridge Rubber Co. Ltd. (313,344). Ryecroft Street, Ashton under Lyne. Increased on April 25 1961, by £72,500 in 62,500 ordinary and 10,000 cumulative preference shares of £1, beyond the registered capital of £2,500.

Paniquil (Sales) Ltd. (634,065), manufacturers of and dealers in padded and quilted plastic panels, etc., 40 New Cavendish Street, W.1. Increased on April 10 1961, by £10,000 in £1 ordinary shares, beyond the registered capital of £10,000.

Resinoid and Mica Products Ltd. (617,959). Trading Estate, Basingstoke Road, Reading. Increased on March 22 1961, by £5,000 in £1 ordinary shares, beyond the registered capital of £10,000.

William Freeman and Co. Ltd. (321,419), manufacturers of and dealers in rubber, etc., Suba Seal Works, Staincross, Barnsley. Increased on June 9 1961, by £50,000 in £1 ordinary shares, beyond the registered capital of £100,000.

Eaglewall Plastics Ltd. (584,422), 36 Station Road, Redhill. Increased on May 17 1961, by £8,400 in 3,500 10% redeemable preference shares and 1,000 7% participating preference shares of £1 and 78,000 ordinary shares of 1s., beyond the registered capital of £100.

CROP RETURNS

Unless otherwise indicated the figures quoted, to the nearest thousand lb., represent crop returns for the month stated and for the number of months of the planting company's financial year to date. Corresponding figures are given in parentheses.

HARRISONS AND CROSFIELD

October

London Sumatra Group: (*a*) Indonesia—3,735 (4,131), 7 mths 24,753 (24,510); (*b*) Malaya—220 (196), 7 mths 1,462 (1,301).

London Asiastic Group: (*b*) Malaya—2,665 (2,536). 10 mths—24,249 (22,980).

Petaling Group: Malaya—2,052 (1,891). 12 mths—22,185 (21,282).

Golden Hope Group: (*c*) Malaya—1,212 (1,043). 8 mths—8,832 (7,565).

Castlefield: Malaya—369 (296). 4 mths—1,446 (1,165).

Holyrood: Malaya—105 (89). 10 mths—936 (853).

Hongkong: Malaya—43 (36). 10 mths—365 (319).

Hoscote: Malaya—312 (294). 4 mths—1,202 (1,112).

Killinghall: Malaya—60 (53). 4 mths—212 (204).

Kuala Selangor: Malaya—74 (66). 10 mths—648 (673).

Malaysia: Malaya—77 (62). 10 mths—662 (588).

Prang Besar: Malaya—371 (349). 7 mths—2,351 (2,350).

Seaport: Malaya—104 (86). 4 mths—425 (348).

Malayalam: South India—1,280 (1,068). 7 mths—5,994 (5,142).

Lunuva: Ceylon—105 (112). 10 mths—853 (993).

Sandac: Borneo—68 (69). 7 mths—421 (487).

Tanah Datar: Indonesia—88 (90). 10 mths—726 (721).

RUBBER ESTATE AGENCY

October

Kuala Lumpur - Kepong (Malaya) — 3,520 (3,144). 1 mth—3,520 (3,144).

Kuala Lumpur-Kepong (E. Sumatra)—323 (356). 1 mth—323 (356).

Bandar Sumatra—87 (95). 3 mths—257 (273).

Batu Kawan—68 (67). 2 mths—130 (135).

Kepitigalla—64 (56). 7 mths—476 (423).

Langkat Sumatra—37 (83). 10 mths—620 (766)

Tambira—121 (115). 4 mths—474 (437).

Amalgamated Rubber—32 (41). 10 mths—426 (387).

Java Rubber—47 (53). 10 mths—701 (753).

Soember Ajoe—13 (20). 1 mth—13 (20).

Sennah—148 (174). 10 mths—1,399 (1,397).

THOMAS BARLOW AND BRO.

October

The Bradwell (FMS) Rubber Estate Ltd.—194. 10 mths—1,581 (1,512).

Chersonese (FMS) Estates Ltd.—73. 10 mths—652 (680).

Highlands and Lowlands Para Rubber Co. Ltd.—2,614. 10 mths—23,466 (22,254).

The Krian Rubber Plantation Co. Ltd.—11. 10 mths—104 (66).

The Sungei Kiran Rubber Estate Ltd.—169. 10 mths—1,499 (1,599).

Latest Wills

Mr Allison Howard Goulty, MA, of Farwood, Richmond Road, Bowdon, Ches., and of 6 Brown Street, Manchester, solicitor, late a director of the New Crocodile River (Selangor) Rubber Co. Ltd., who died on August 31, left £45,548 gross, £44,494 net value.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from "The Trade Marks Journal"—given below are reproduced by permission of the Controller of H.M. Stationery Office.

Arburg (814,634). Machines for processing thermoplastics. Arthur Hehl, Karl Hehl and Eugen Hehl, trading as Arburg Feingeraete-Fabrik o.H.G. Hehl and Soenhe, Lossburg, Wuerttemberg, Germany. Address for service is c/o Potts and Co., 15 Hamilton Square, Birkenhead. (Class 7; November 8 1961.)

Arracolene (817,667). Plastics included in Class 1 for use in manufactures. The Rubber Regenerating Co. Ltd., First Avenue, Trafford Park, Manchester, 17. (Class 1; November 8 1961.)

Black Prince (822,528). Sheet materials of plastics included in Class 17 for use in agriculture and horticulture. Polyglaze Ltd., Factory 18, Victoria Road, Burgess Hill, Sussex. (Class 17; November 8 1961.)

Defanto (818,760). Tubes included in Class 17 for use in the vulcanization of tyres. Veb Reifenwerk Fürstenwalde, Tränkeweg, Fürstenwalde-Süd (Spree), Germany. Address for service is c/o H. A. L. Venner, 1 Great James Street, Bedford Row, London, W.C.1. (Class 17; November 8 1961.)

'Duradur' (815,519). Coverings to prevent radiation of heat; rubber covers for cylinders; non-metallic hose pipes and patching material therefor; insulators; jointings, linings, packings, non-metallic valves and washers, all included in Class 17; packing rings and packing sleeves; stuffing devices; and rubber tubing. Hans Pahl, trading as Pahl'sche Gummi-und Asbest-Gesellschaft 'Paguag', 41 Gatherhof, Düsseldorf-Rath, Germany. Address for service is c/o Heron Rogers and Co., Bridge House, 181 Queen Victoria Street, London, E.C.4. (Class 17; November 8 1961.)

Parez (B815,864). Synthetic resins for use in manufactures. American Cyanamid Co., 30 Rockefeller Plaza, City of New York, State of New York, USA. Address for service is c/o Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. (Class 1; November 8 1961.)

Suitable for use with most chemicals is this 100ml. measuring cylinder, moulded in Tyril 767 styrene acrylonitrile copolymer marketed by British Resin Products Ltd., is manufactured by Technical Treatments Ltd., Otford, Kent, and is the first of a whole range

NEW COMPANIES

Polymec Laminations Ltd. (706,532). October 26. Capital: £3,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, reinforced fibre glass, and dealers in articles, goods and fabrics made therefrom, etc. The directors are: Ian M. Robson, 204 Nevells Road, Letchworth; Peter J. Hill, 24 Roebuck Court, Turpins Rise, Stevenage. Regd. office: Midland Bank Chambers, Letchworth.

Marshall, Lewis Ltd. (708,156). November 15. Capital: £100 in £1 shares. To carry on the business of merchants and stockists of and dealers in plastics and synthetic materials of all kinds; manufacturing chemists and plastics manufacturers, etc. The directors are: Helen Lewis, 85 Howberry Road, Canons Park, Edgware, Middx.; Max Marshall, 33 Broadhurst Avenue, Edgware, Middx. Regd. office: 13 Thayer Street, W.1.

Hargreaves and Lewis (Sealants) Ltd. (708,427). November 17. Capital: £1,000 in £1 shares. To carry on the business of builders; to manufacture and deal in glass, plastics, adhesives, mastics and sealers and other waterproofing agents, etc. The directors are: Gerald W. Hargreaves and Mrs Joan B. Hargreaves, both of Maenporth, Acre Lane, Heswall, Wirral. Regd. office: 1/3 Wood Grove, Liverpool, 13.

Signs in Plastic Ltd. (708,528). November 20. Capital: £100 in £1 shares. To acquire the business of sign makers carried on at 159 Mare Street, E.8, as 'Signs in Plastic' etc. The directors are: John E. Bush, 24 Barnfield, Epping, Essex; Max Horton, 39 Dingle Gardens, E.14.

Hayes and Parkinson (Merchandises) Ltd. (708,428). November 17. Capital: £100 in £1 shares. To carry on the business of manufacturers, designers, fabricators, convertors and processers of and dealers in reinforced plastic materials, and goods made therefrom, etc. The directors are: George W. Parkinson, 9 Captain French Lane, Kendal; John V. Parkinson, 7 Gandy Street, Kendal; Elsie A. Parkinson, 27 Castle Street, Kendal. Regd. office: 9 Captain French Lane, Kendal.

Whetwell and Haley Engineering, Ltd. (708,531). November 20. Capital: £5,000 in £1 shares. To carry on the business of engineers to the plastics industry, etc. The directors are: David G. Stern, Ingestre Rectory, Ingestre, Staffs.; Wilfred B. Spinks, 20 Windsor Road, Stafford. Regd. office: 10 Mill Street, Cannock, Staffs.

Hennessey Plastics Ltd. (708,560). November 21. Capital: £100 in £1 shares. To carry on the business of exporters, importers and manufacturers of and dealers in thermoplastic and plastic substances, etc. The directors are: Herbert W. Hennessey (chairman), Raymond W. Hennessey and Beatrice I. Hennessey, all of 'Macree', New Brighton Road, Emsworth, Hants.; Sheila I. Fleming, 33 Lawrence Drive, Ickenham, Uxbridge, Middx. Regd. office: Downley Road, Havant North Industrial Estate, Havant, Hants.

Nansen Plastics, Ltd. (708,578). November 21. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in fibre glass mouldings, etc. The directors are: Brian F. Povey (permanent director and chairman), Keith Vickery and Derek Harris, addresses not stated.

Rubber and Plastics (Leicester) Ltd. (708,627). November 21. Capital: £5,000 in £1 shares. To carry on the business of manufacturers of and dealers in rubber sheets, rubber insertion sheets, rubber hose, plastic and polythene sheets and tubing, etc. The first directors are to be appointed by the subscribers. Regd. office: Allen House, Newark Street, Leicester.

Eastern Oil Palms Ltd. (708,677). November 22. Capital: £200,000 in £1 shares. To acquire lands in the Federation of Malaya and elsewhere, for the cultivation of oil palms, rubber and other tropical produce, etc. The first directors are to be appointed by the subscribers. Regd. office: Three Quays, Tower Hill, E.C.3.

Fullwood Tyre Services Ltd. (708,682). November 22. Capital: £5,000 in £1 shares. The directors are: Harold T. Fullwood, The Grove, Wood Road, Tettenhall; Edward Y. Fullwood, 2 Langley Road, Merry Hill, Wolverhampton; James H. Fullwood, 113, Henwood Road, Compton, Staffs. Regd. office: 11 Chapel Ash, Wolverhampton.

Fenbridge Products Ltd. (708,681). November 22. Capital: £10,000 in £1 shares. To carry on the business of importers, exporters and manufacturers of and dealers in plastic and other materials, etc. The directors are: Donald A. J. Draper, 52 Belmont Hill, S.E.15; Keith Lomas, Gaddesdon Hall, Water End, Hemel Hempstead; Dacre V. Sharp; Walter Schroeder; James H. Wheatley; Beverley F. A. Wigmore and David R. Wheatley. Regd. office: Stephyns Chambers, Bank Court, Hemel Hempstead, Herts.

Hotfeet-Hotseat Ltd. (708,685). November 22. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, modelling and moulding materials, etc. The directors are: Mrs Kathleen W. Robinson, 93 Castleton Avenue, Wembley, Middx. (director of Anderflow Heat Ltd.); John S. Robinson, 'Roseland', Millbrook, Cornwall. Regd. office: 27a St. John's Road, Wembley, Middx.

M. B. Moss and Co. Ltd. (706,472). October 26. Capital: £100 in £1 shares. To carry on the business of makers of and dealers in plastic welded goods, etc. The directors are to be appointed by the subscribers. Regd. office: 82Z Portland Place, W.1.

St. Bernard Plastics Ltd. (706,645). October 27. Capital: £5,000 in £1 shares. To carry on the business of plastic engineers, etc. The directors are to be appointed by the subscribers.

Reputable Plastics Ltd. (706,643). October 27. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, etc. The directors are to be appointed by the subscribers. Regd. office: 6 Surrey Street, W.C.2.

Sunstant Plastics Ltd. (707,095). November 1. Capital: £500 in £1 shares. To carry on the business of manufacturers of and dealers in plastic materials and articles, etc. Stanley Sharp signs as director. Regd. office: 103 Nab Wood Drive, Shipley, Yorks.

C.T.R. Plastics Ltd. (707,377). November 6. Capital: £100 in shares. To carry on the business of manufacturers of and dealers in plastics, etc. The first directors are to be appointed by the subscribers. Regd. office: Hartnup Place, Liverpool, 5.

What is believed to be the first bulk use in the UK of moulded confectionery trays made from metallized materials is shown here. The trays are vacuum-formed from unplasticized pvc metallized by E. S. and A. Robinson Ltd., whose association with I.C.I. to develop plastics packaging applications was announced recently

County Court Judgments

NOTE.—These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.

Williams Tyre Service (a firm), 634 Harrow Road, London, N.W.10. Marylebone, £16, June 26 1961.

Indo-Rubber Supplies (Coventry) Ltd., r/o 211 Broadgate House, Coventry, Warwicks. Coventry, £81, June 1, 1961.

Leonard William Aldridge, 32, Watsons Avenue, St. Albans, Herts, sponge rubber mills. St. Albans, £24, June 8 1961.

F. M. Cant (widow), 78-80 Jubilee Road, Weston-Super-Mare, Som., plastics dealer. Weston-Super-Mare, £32, June 14 1961.

C. R. Plastics Ltd., r/o 110 Marlborough Road, London, N.19. Clerkenwell, £135, June 13 1961.

E. Spitzer (t/a C. R. Plastics) (male), 110 Marlborough Road, Holloway, London, N.19. Luton, £47, June 9 1961.

Geoffrey Morris, 91 Surbiton Road, Kingston-upon-Thames, Surrey, plastics manufacturer. Westminster, £45, June 28 1961.

Wilkinson Plastic Products, 44 The Leasowe, Lichfield, Staffs., manufacturers. Birmingham, £18, May 12 1961.

Allan Cooper, India Tyre and Rubber Co., Kingsbury Road, N.W.7. Middlesex. Willesden, £11, August 10 1961.

F. C. Wellings, T/A Dudley Plastic Co., 23 Dudley Street, Eve Hill, Dudley, Worcs., manufacturer of plastics goods. Dudley, £74, August 14 1961.

Val D'Or Rubber Estates Ltd., Gitchfield Works, Coalport, Ironbridge, Salop. Shoreditch, £177, August 1 1961.

Lightweight Plastics Ltd., Slade Lodge, Slade, Ilfracombe, Devon. Barnstaple, £92, July 31 1961.

Lightweight Plastics Ltd., Slade Lodge, Ilfracombe, Devon. Edmonton, £149, August 8 1961.

Aerofoam Products, 2 Waterloo Road, Norwich, Norfolk. Ilford, £58, August 23 1961.

Poliastic Ltd., R/o Adam House, Fitzroy Square, London, W.1, Basingstoke, £94, September 26 1961.

Poliastic Ltd., R/o Adam House, Fitzroy Square, London, W.1, plastic manufacturers, Basingstoke, £110, September 26 1961.

Plastic Liners Ltd., Design Works, 3 Colt Street, London, E.14, Hastings, £58, September 14 1961.

E. Spitzer (male) (T/A C.R. Plastics), 110 Marlborough Road, London, N.19, Clerkenwell, £124, September 19 1961.

Acton Tye Co., 230 Horn Lane, Acton, London, W.3, Westminster, £11, October 16 1961.

Polyplak (Containers) Ltd., Taplow Road, Taplow, Maidenhead, Berks., Slough, £27, October 10 1961.

Harry Bell, 93 Brinksway, Stockport, Ches., tyre factor, Stockport, £64, October 3 1961.

Lightweight Plastics Ltd., Slade, Ilfracombe, Devon, plastic manufacturer, Birmingham, £51, September 14 1961.

Changes of Name

Geo. Howorth Tyres (Leighton) Ltd. (617,835), 165 Cromwell Road, Peterborough. Name changed to Geo. Howorth Tyres (Great Britain) Ltd. on May 4 1961.

Tallent Plating Ltd. (452,916), The Rubber Works, Petersfield, Hants. Name changed to Tallent Engineering Ltd. on May 1 1961.

Plasticlas Ltd. (481,913), manufacturers of and dealers in plastics, etc., 82Z Portland Place, W.1. Name changed to Rose Bloom Ltd. on August 25 1961.

Z. Sebes (Rubber) Ltd. (497,121), Goat Road, Beddington Corner, Mitcham. Name changed to Sebes Rubber Ltd. on August 28 1961.

South-Western Rubber Co. (Bristol) Ltd. (512,410), 25 Nelson Parade, Bedminster, Bristol. Name changed to South Western Credit Sales Ltd. on September 1 1961.

Plant Installations Ltd. (617,049), 13 Southampton Place, W.C.1. Name changed to Rugby Plastics Ltd. on August 15 1961.

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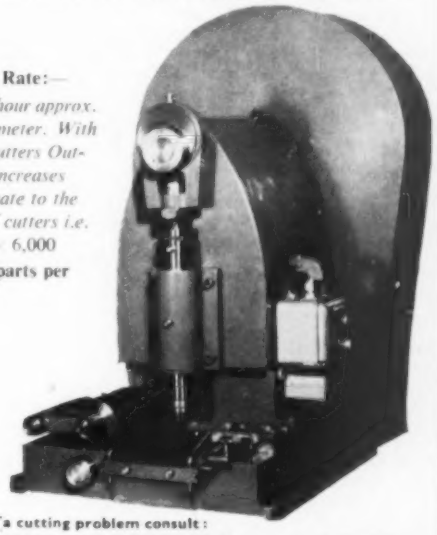

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INDEX to ADVERTISERS

	Page
Abrasive Developments Ltd.	—
A.E.W. Ltd.	—
Allcock, J., & Sons Ltd.	vi
Amalgamated Oxides (1939) Ltd.	—
Anchor Chemical Co. Ltd.	971
Anderson, Joseph, & Sons Ltd.	—
Armour Hess Chemicals Ltd.	—
Associated-Rediffusion Ltd.	—
Astor Boisselier & Lawrence Ltd.	—
Baker Perkins Ltd.	ii
Barwell Engineering Ltd.	1006
Belgrave Industries (Exports) Ltd.	viii
Berk, F. W., & Co. Ltd.	—
Berstorff, Hermann	—
B.I.P. Chemicals Ltd.	—
Birch, Singleton, W., & Sons Ltd.	—
Bone Bros.	—
Boston Marine & General Eng. Co. Ltd.	—
Bridge, David, & Co. Ltd.	973
Bright, John, & Bros. Ltd.	Cover iii
British Electrical Development Association	989
British Geon Ltd.	xv
British Nylon Spinners Ltd.	—
British Recovered Rubber Co. Ltd.	iii
British Resin Products Ltd.	—
British Titan Products Co. Ltd.	—
British Transport Commission	—
Bush Beach & Segner Bayley Ltd.	—
Cabot Carbon Ltd.	977
Carter Bros. (Rochdale) Ltd.	—
Catomance, Ltd.	xiii
Carlton Press Knives Ltd.	—
Chance & Hunt	—
Chemical & Insulation, Ltd.	—
C.I.C. Engineering Ltd.	—
Cleggswood Oil Distillery Ltd.	—
Cohen, George, Sons & Co. Ltd.	—
Columbian International (Gt. Britain) Ltd.	v
Consolidated Zinc Corporation (Sales) Ltd.	xiv
Courtaulds Ltd.	—
Crosfield, Joseph, & Sons Ltd.	—
Croxton & Garry Ltd.	—
Derrick Davis Plastics Ltd.	—
Dietzel, Hugo	—
Distillers Co. Ltd., The	—
Dixon, T. H., & Co. Ltd.	i
Docker, John, & Co. (Engs.) Ltd.	967
Dunlop Rubber Co. Ltd.	987
Du Pont Co. (United Kingdom) Ltd.	—
Durham Raw Materials Ltd.	—
Economist Intelligence Unit Ltd., The	
Ellison, George, Ltd.	—
English Clays Lovering Pochin & Co. Ltd.	Cover ii
English Electric Co. Ltd., The	—
Esso	—
eur-O-matic	—
Fawcett Preston & Co. Ltd.	vii
Felber Juker & Co. Ltd.	ix
Ferguson, A. O., & Co. Ltd.	994
Ferguson, James, & Sons Ltd.	—
Ferguson Shiers Ltd.	—
Firestone Tyre & Rubber Co. Ltd.	—
Foamair Ltd.	—
Geigy Co. Ltd., The	—
Goodyear Tyre & Rubber Co. Ltd.	—
Greeff, R. W., & Co. Ltd.	—
Gresham & Craven Ltd.	—
Gummi und Asbest	—
H.F. Industrial Services Ltd.	—
H.K. Import & Export Ltd.	—
Halsteads Engineers (Leyland) Ltd.	—
Hankin, Geo., & Co. Ltd.	—
Hardman & Holden Ltd.	—
Harrison Jones	—
Hatcham Rubber Co. Ltd.	xii
Hay & Robertson Ltd.	—
Hilton, Wallace, & Co. Ltd.	—
Hubron Rubber Chemicals Ltd.	—
Hughes & Hughes Ltd.	1005
Hunt Heat Exchangers Ltd.	—
Iddon Bros. Ltd.	iv
Iliffe Industrial Publications Ltd.	—
Imperial Chemical Industries Ltd. (Billingham)	—
Imperial Chemical Industries Ltd. (Dyestuffs)	975
Imperial Chemical Industries Ltd. (Plastics)	xvi
Imperial Chemical Industries Ltd. (Terylene)	—
Institution of the Rubber Industry	—
International Corporation Ltd.	—
International Synthetic Rubber Co. Ltd.	979
Ioco Ltd.	—
K.W. Chemicals	—
Kautschuk und Gummi	—
Kendell, T., & Sons Ltd.	—
Ketjen Carbon	—
Kuala Lumpur-Kepong Amalgamated Ltd.	—
Lankro Chemicals Ltd.	—
Laporte Titanium Ltd.	—
Latex Engineering Co.	994
Lavino (London) Ltd.	—
Leader, Denis, Ltd.	—
Leaver, Donald, Ltd.	—
Leeds & Bradford Boiler Co. Ltd., The	—
Lindsay & Williams Ltd.	—
Lonabarc Ltd.	—
Londex Ltd.	—
London & Scandinavian	—
Lord, R., & Sons Ltd.	—
McKechnie Bros. Ltd.	—
Maclaine, Watson & Co. Ltd.	xiv
Merkle, P. W., Ltd.	1005
Mersey White Lead Co. Ltd., The	—
Metal Box Co.	—
Micafine Ltd.	—
Monsanto Chemicals Ltd.	—
Morton Machine Co. Ltd.	—
Muehlstein, H., & Co. (London) Ltd.	
Muller, Max	—
Natural Rubber Bureau	—
New Conveyor Co. Ltd.	—
Noble Lowndes Pension Service, The	—
Northwestern Rubber Co. Ltd.	x
Novadel Ltd.	—
Oakes, E. T., Ltd.	xi
Oswald & Duncan Ltd.	x
Philblack Ltd.	968
Phoenix Rubber Co. Ltd.	—
Planters Engineering Co. Ltd.	—
Polymer (United Kingdom) Ltd.	Cover i
Preston Tyre Fabric Manufacturing Co. Ltd.	vi
Price's (Bromborough) Ltd.	—
Pullen, James H., (1942) Ltd.	—
Quick-Wrap Tubing Co. Ltd.	—
Reed Bros. (Eng.) Ltd.	—
Revue Generale du Caoutchouc	1004
Rhein-Chemie GmbH.	—
Robinson Bros. Ltd.	—
Ro-Search Inc.	—
Robinson, Joseph, & Co. Ltd.	—
Rotunda Ltd.	—
Rubber Age (New York) Ltd.	—
Rubber Estate Agency Ltd.	—
Rubber Latex Ltd.	—
Rubber Regenerating Co. Ltd.	Cover iv
Scott Bader & Co. Ltd.	—
Sealants Ltd.	—
Shaw, Francis, & Co. Ltd.	—
Shell Mex & B.P. Ltd.	—
Shell Chemical Co. Ltd.	—
Shell International Chemical Co. Ltd.	991
Smith, Alfred, Ltd.	—
Smith, Wilfrid, Ltd.	viii
Squire, Frederick, Ltd.	—
Stechler, L., & Co. Ltd.	—
Steel, J. M., & Co. Ltd.	—
Steele & Cowlishaw Ltd.	—
Stocker, W. B., & Co. Ltd.	—
Storeys of Lancaster	—
Stott, James, Ltd.	—
Sturge, John & E., Ltd.	—
Sussex Rubber Co. Ltd.	—
Sutcliffe Engineering Components Ltd.	—
Sutcliffe Speakman & Co. Ltd.	—
Tanner Bros. (Greenfield) Ltd.	—
Tilghman's Ltd.	—
Union Carbide Ltd.	—
United Norit Sales Corporation Ltd.	—
United Wire Works Ltd., The	—
Universal Oil Co. Ltd.	983
Universal Oil Products Co.	—
Vacu-Blast Ltd.	—
Verson Engineering Co. Ltd.	viii
Wallace, H. W., & Co. Ltd.	xii
Wallis Engineering Co.	—
Washington Chemicals	—
Webb, W. F. (Engineers) Ltd.	—
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Whiffen & Sons Ltd.	—
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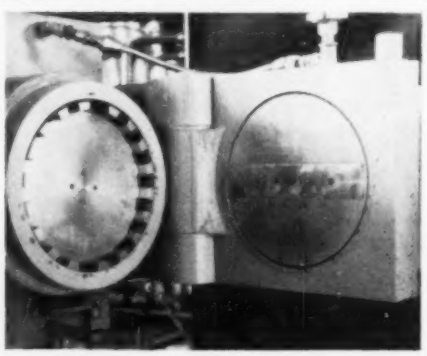

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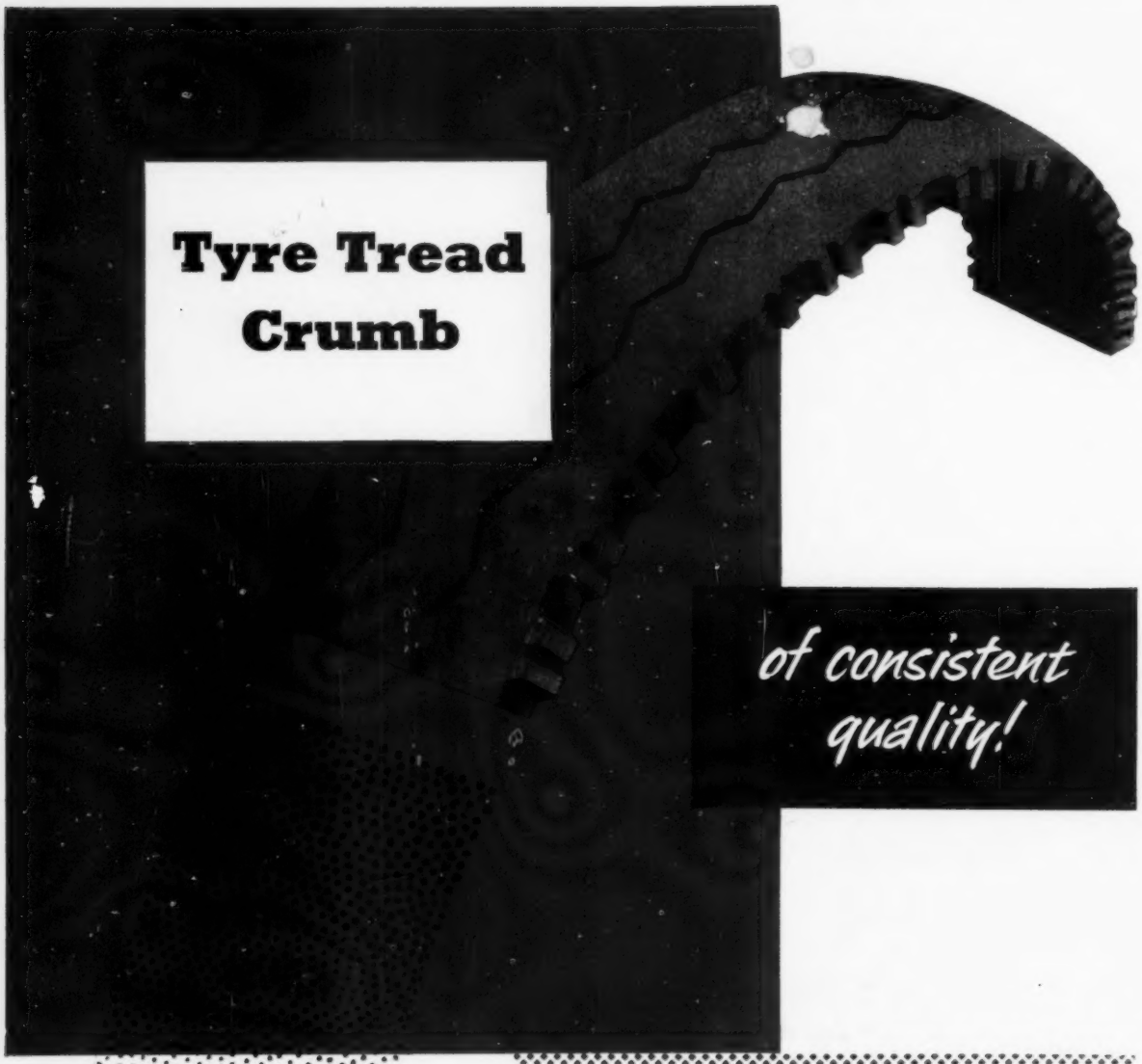

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